DECEMBER, 1926

Railway Engineering and Maintenance

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Railway Engineering and Maintenance

Formerly the Railway Maintenance Engineer

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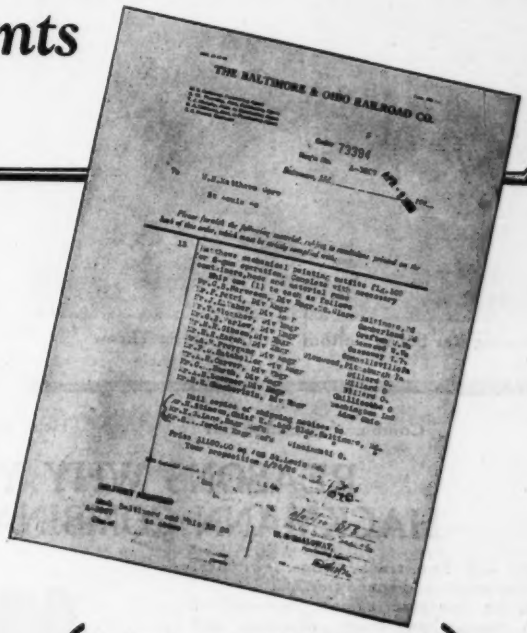
After One Year's Test

B&O orders 13 Matthews Mechanical Painting Equipments


THE BALTIMORE & OHIO RAILROAD CO.

Order 73394

The above is an exact reproduction of the order placed by the B. & O. Railroad after testing two Matthews Mechanical Painting Equipments on maintenance-of-way painting for a year.

In 1924 Shepherd & Smith bought four Matthews Mechanical Painting Equipments and used them to paint the interior of the new grain elevator of the Baltimore & Ohio Railroad at Baltimore, with over 3,000,000 sq. ft. of surface. On an investment of less than $2400.00 they computed the saving over brush application to be at least 50% and the job was finished in one-fifth of the time.

Like most railroads the maintenance-of-way department was hard pushed to keep caught up with its maintenance painting. With the record of saving and speed on the Baltimore Grain Elevator job, Mechanical Painting was recognized as the answer to their painting problems. In March, 1925, they bought two Figure 105 Matthews Equipments. After trying them for a year on maintenance-of-way painting, they showed a saving of 40%. In April, 1926 the B. & O. placed the order shown above for 13 more Figure 105 Matthews Mechanical Painting Equipments, putting one on each division of the road. Maintenance painting on the B. & O. is progressing rapidly and at a big saving.

Every railroad can profit by the experience of the B. & O. Other large railroads are using Matthews Equipments. All report a saving of time and money. The Figure 105 Matthews Mechanical Painting Equipment is a complete two unit, heavy duty equipment built especially for railroad and similar maintenance work. Let us tell you how you can do your maintenance painting with greate rspeed and at a considerable saving.

W. N. MATTHEWS CORPORATION
3770 Forest Park Blvd. • • • St. Louis, U. S. A.

GET THIS INTERESTING BOOKLET

"Mechanical Painting For Maintenance" is a 12-page booklet that will answer many of the questions you will want to ask about your painting problems. Tells about mechanical painting in general. Gives comparative costs on brick, corrugated iron, stucco, weatherboard, shingle roofs, tanks and all kinds of interior surfaces.

Gives full information regarding the different kinds of materials handled and how to select them. Shows photographs of different equipments and close-ups of various units in their make up. Gives extracts from fourteen letters received from prominent manufacturers regarding their experiences. Has a page of questions and answers. Tells about instruction given your men and service you can expect. Send for this booklet today.

Fig. 105 *Complete two unit, heavy duty equipment. Air capacity sufficient to operate three guns or one rotary wire brush.*

MATTHEWS
MECHANICAL PAINTING
EQUIPMENT

21 M P

SAVE 60% OF YOUR LABOR AND TOOL COST

NOW IN USE ON OVER 100 RAILROADS

Showing Bar Set in Bottom Notch for First Throw

Showing Bars Set in Upper Notch for Second Throw

Combination Lining Bar

Heat Treated

Combination Tamping Bar

REASONS WHY YOU SHOULD USE HACKMANN COMBINATION TRACK LINERS

They will line track, frogs, switches, raise low joints and space ties.

Can be operated against the end of switch ties when lining turnouts and puzzle switches.

You can make at least two pulls without resetting the base.

Three to five men can now do the work formerly done by seven to nine men and seven men can do the work of fifteen to twenty men.

They will pay for themselves in a very short time in the saving of labor and tools.

Recent tests have shown that it is not necessary to resurface track when laying new rail on old ties. It has been found that the road bed is in better shape and more solid when not disturbed and in many cases will save this cost of resurfacing for some time to come.

Hackmann Combination Track Liner
Weight 20 lbs.

The lining and tamping bars are heat treated and the base is made of steel. Base weighs only 20 lbs.

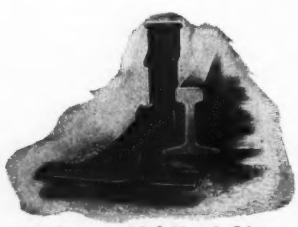
Our track liners are made of only two parts. Nothing to get out of order; very little digging necessary to set liners.

The use of these tools eliminate the constant use of other tools in connection with its performance.

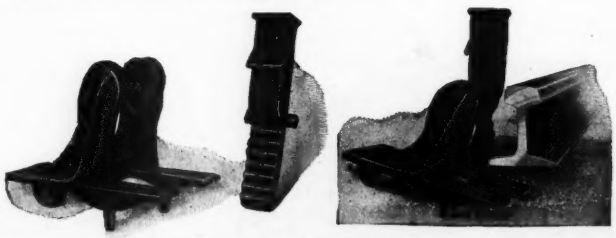
Track lined with our liners remain in place longer than when lined with ordinary lining bars, as you do not disturb the roadbed.

More satisfactory results can be obtained with the Hackmann Track Liner than any other liner on the market.

WE ARE STUDYING YOUR PROBLEMS AND WILL GLADLY DEMONSTRATE OUR METHOD OF LINING TRACK ON REQUEST



Hackmann Idol Track Liner



Hackmann Duplex Track Liner

FOR USE WITH ANY ORDINARY LINING BAR

THE HACKMANN RAILWAY SUPPLY CO.

RAILWAY LABOR SAVING DEVICES—723 So. Wells St., CHICAGO, ILL.

FREDERICK HACKMANN,
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Secretary and Treasurer

BALDWIN LOCOMOTIVE WORKS
Foreign Representatives

THE HOLDEN CO., Ltd., Canada
Toronto Montreal Winnipeg Vancouver

ELECTRIC TIE TAMPING

For All Kinds of Ballast

No matter what kind of ballast is used, rock, gravel or a finer aggregate, Jackson Electric Tie Tampers can be used and will produce a far superior roadbed than can possibly be procured by hand tamping.

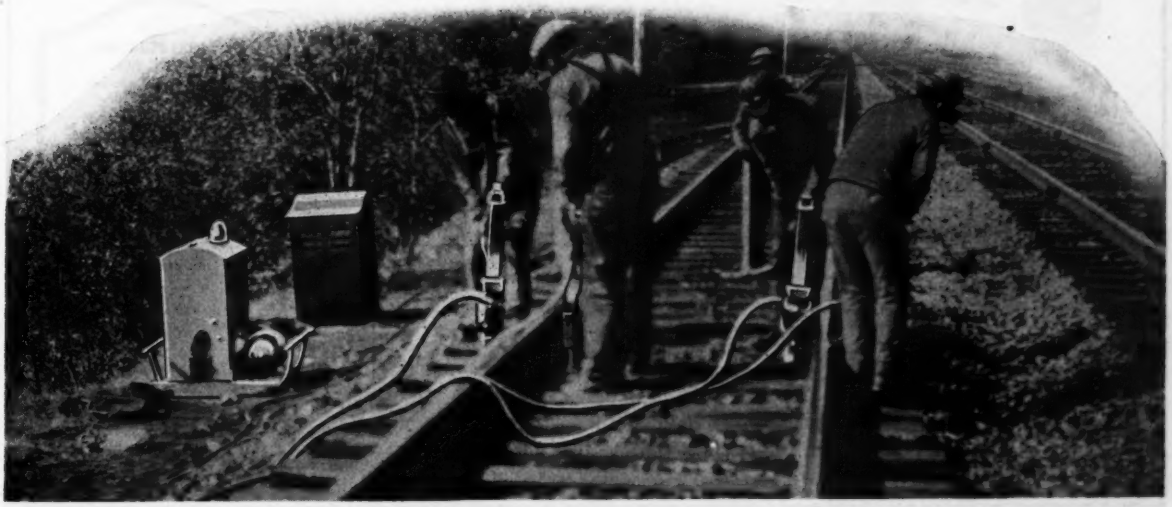
Electrical current is supplied by the Jackson Portable Power Plant, built in sizes suitable for the operation of 4, 8 and 12 tamping units. The small amount of space occupied by these plants enables placing them at any point along the roadway.

The illustrations show Jackson Electric Tie Tampers in operation on both rock and light ballast roadbeds and gives an idea of the portability of the Power Plant.

Write us for full description of both appliances.

ELECTRIC TAMPER & EQUIPMENT CO.

CHICAGO ILLINOIS



A Mouthful at Every Bite

JAWS OPEN—a swift downward plunge—and the teeth of the Owen Bucket bite deep into the material. The jaws close—and the Owen Bucket comes up with a mouthful—every time!

There is no damaging shock when the bucket drops. The striking impact is transferred from the hinges and the center shaft, to the counterweight, by means of four cushion stops. The resilient steel of the counterweight absorbs the shock. The impact is gradual or "distributed" because of the angle at which these cushion stops engage the counterweight.

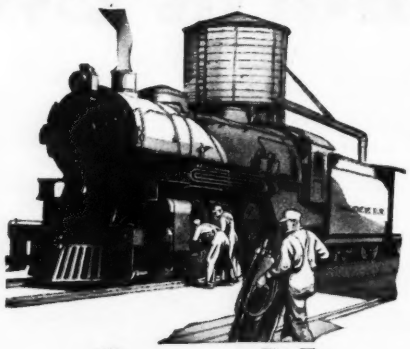
The five-to one-closing power, together with the concentration of weight around the center shaft, gives the Owen Bucket great digging power and ample speed of closing—the ideal combination for practically all uses.

It's a whale of a good bucket—and like the whale, the Owen Bucket gets A Mouthful At Every Bite.

THE OWEN BUCKET CO.
6019 BREAKWATER AVENUE
CLEVELAND, OHIO

BALTIMORE CHICAGO DALLAS DETROIT LOS ANGELES MINNEAPOLIS PHILADELPHIA
PITTSBURGH NEW YORK MIAMI PORTLAND ST. LOUIS SAN FRANCISCO TAMPA

How we look out for new developments



Oxweld Railroad Service

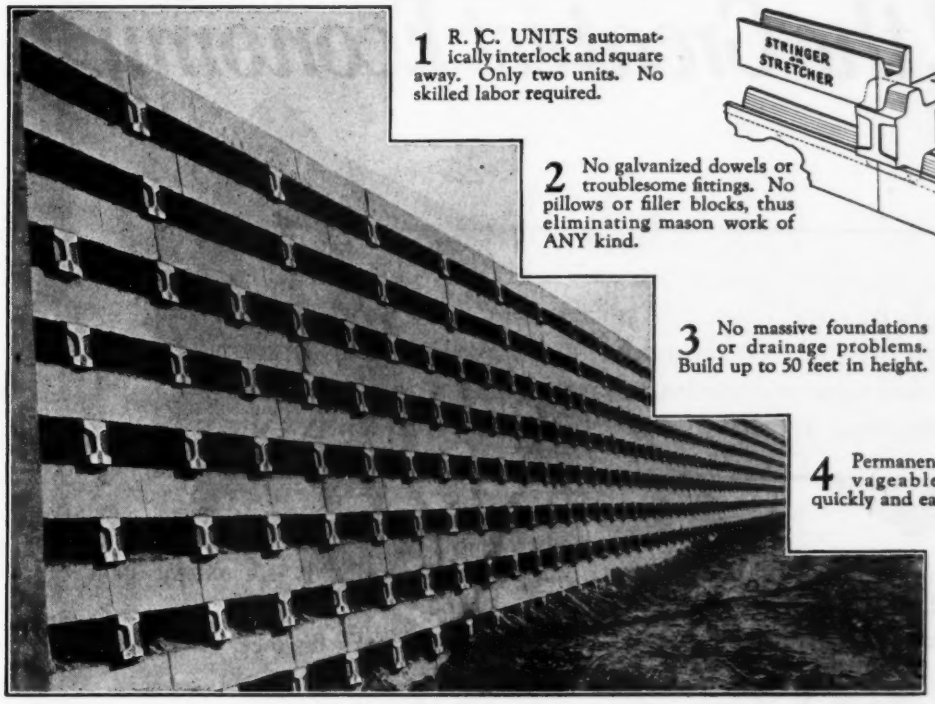
OVER three years ago, after extensive tests on many kinds of steel welding for railroads, Oxweld Railroad Service adopted the Oxweld High Test No. 1 steel welding rod. This rod was built to specifications laid down by the engineers of the company, perfected in the research laboratory, and has been patented. It gives 20% stronger welds, even in the hands of the average welder, and the welds are 20% cheaper to make.

This is typical of Oxweld Railroad Service. New developments are constantly being tested out.

Every new development that proves valuable is adapted to railroad work and to the specific problems of each railroad by a staff of welding and cutting instructors.

THE OXWELD RAILROAD SERVICE COMPANY
NEW YORK CITY: Carbide and Carbon Building
CHICAGO: Railway Exchange

They Cut the Cost 50%—*because*



1 R. C. UNITS automatically interlock and square away. Only two units. No skilled labor required.

2 No galvanized dowels or troublesome fittings. No pillows or filler blocks, thus eliminating mason work of ANY kind.

3 No massive foundations or drainage problems. Build up to 50 feet in height.

4 Permanent or 100% salvageable — removed quickly and easily.

5 Can be specified as definitely as structural steel with ASSURED results.

Know These Five Steps
to Retaining Wall Economy

THE most conservative engineers recommend R.C. retaining walls as the most modern accepted type. R. C. Crib Walls are serving the severest railroad traffic. Their advantages are obvious. Simply place the header and stretcher units and follow with the backfill — saving over half the cost of monolithic construction. The result—a wall of pleasing appearance and permanent—yet easily salvaged.

R. C. Units are designed and used by Engineers

R. C. Units are used on big jobs and small ones. The book at the right contains illustrations of many typical installations by railroads and other prominent users. It gives actual comparative costs, shows wall details and gives standard specifications. Also many other useful items for the engineer and contractor.

Send the coupon for your copy—
for immediate use or for your file

THE R. C. PRODUCTS COMPANY, Inc.
ENGINEERS BUILDING, CLEVELAND, OHIO
New York Chicago Norfolk Indianapolis San Francisco

PRECAST AUTOMATIC **PRODUCTS** INTERLOCKING CRIBBING FLEXIBLE

As used by the Wabash

The photograph above shows an R. C. Wall built by the Wabash in Detroit. It was built in freezing winter weather.

SEND FOR THIS BOOK

The R. C. Products Co., Inc.
Engineers Bldg., Cleveland, Ohio

Send me your free book of Retaining Wall Data ☐
Also complete information on the use of R. C.
Units for the following purposes_____

_____

*Company Name*_____

*Individual's Name*_____

*Address*_____

The Greatest Advantage and the Greatest Economy

"Any practice, custom or method of consumption that tends to substitute the temporary for the durable is wasteful and extravagant...They are vastly more detrimental to progress than many of the other forms of extravagance to which our attention is frequently called."

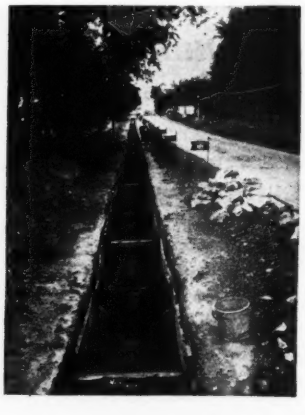
THESE words, originally printed in the publication of a banking institution, were lately reprinted in a bulletin of the Department of Commerce, U. S. A.

In them are found the greatest reason for the use of Cast Iron Pipe.

It Is Permanent

The actual limits of its working life under average conditions are as yet undetermined. It will take the tests of additional centuries to determine how long Cast Iron Pipe will resist corrosion. No case has ever come to light where Cast Iron Pipe wore out under average service conditions.

A waterworks must be built for permanence. It serves the people in their settled abode. It is a service upon which they depend.



The Waterworks Engineer can depend upon Cast Iron Pipe.

A well made, properly laid water main of Cast Iron Pipe can be safely put under pavement with assurance that, barring accident, it will function for hundreds of years.

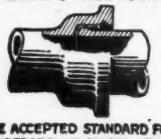
Population is bound to increase to the point where larger mains are needed. Cast Iron Pipe in the present mains can be taken up, and relaid with the assurance that it will be good for hundreds of years to come.

The service of this Bureau is always available on any plan involving the use of Cast Iron Pipe.

Address: RESEARCH ENGINEER
THE CAST IRON PIPE PUBLICITY BUREAU, PEOPLES GAS BUILDING, CHICAGO

CAST IRON PIPE

THE BELL & SPIGOT JOINT



THE ACCEPTED STANDARD FOR UNDERGROUND CONSTRUCTION

Our new booklet, "Planning a Waterworks System," which covers the problem of water for the small town, will be sent on request

Send for booklet, "Cast Iron Pipe for Industrial Service," showing interesting installations to meet special problems

Today— what is expected?

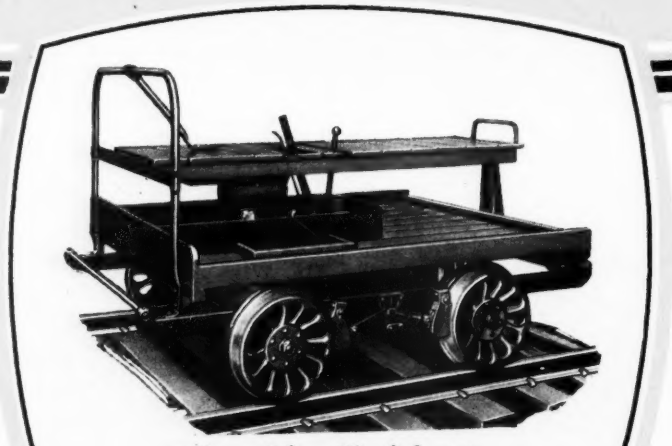
When the first Sheffield section motor car was blazing the trail thirty years ago, section car operators were glad to have a *motorized* car. That was a big new step.

Today their demands are more specific. They want the utmost in dependability, sturdy construction, ease of operation, convenience. They want mechanical perfection that places section motor cars on a new plane. They want, in a word, section cars that reflect the same advancement in design that is found in the revolutionary developments of the modern automobile.

They know that one line of cars gives them these qualities. Men who daily use Fairbanks-Morse Sheffield Motor Cars fully appreciate what thirty years of experience and constant development mean in section motor car performance.

FAIRBANKS-MORSE
MOTOR CARS

First on the rails — and still first



The Sheffield 45

Leading—

in the light section car class

FEATURES like the Ricardo cylinder head, three-point suspension, positive drives and automobile-type pressed steel frames attest the progressiveness of Fairbanks-Morse design.

They explain why the Sheffield 45—the newest of F-M Sheffield cars—has quickly won a leading place in its class. Strictly abreast of the most modern automotive practice, the Sheffield 45 offers the light section car user such advanced features as:

—Two-cylinder, opposed, air-cooled, four-cycle engine, with patented Ricardo cylinder head which has been a sensation throughout the automotive field because of the increased power and higher efficiency it produces.

—Three-point suspension of engine.

—Highly developed magneto which gives a hot spark at slow cranking speeds and thus insures easy starting automatic spark control.

—Drop-forged crankshaft mounted on Timken taper roller bearings, reducing friction and absorbing radial and thrust loads.

—Greatly simplified friction transmission with countershaft mounted on S. K. F. self-aligning ball bearings.

—Pressed steel auto-type frame.

—Largest deck space ever provided on a section car—22 square feet of unobstructed tool space.

—Body readily lifted off by simply removing four bolts.

In advanced design, in dependability of performance under all conditions, the "45" is typical of the entire F-M line of cars—a section motor car for every purpose.

The "40-B"

Foremost in everything a fine section car should be. Known for its great power, its exceptional performance, and outstanding dependability.

The "44"

The one-cylinder water-cooled car that made belt troubles a thing of the past. Its outstanding feature is a smooth-acting, fool-proof, positive clutch that controls the car through an efficient chain drive.

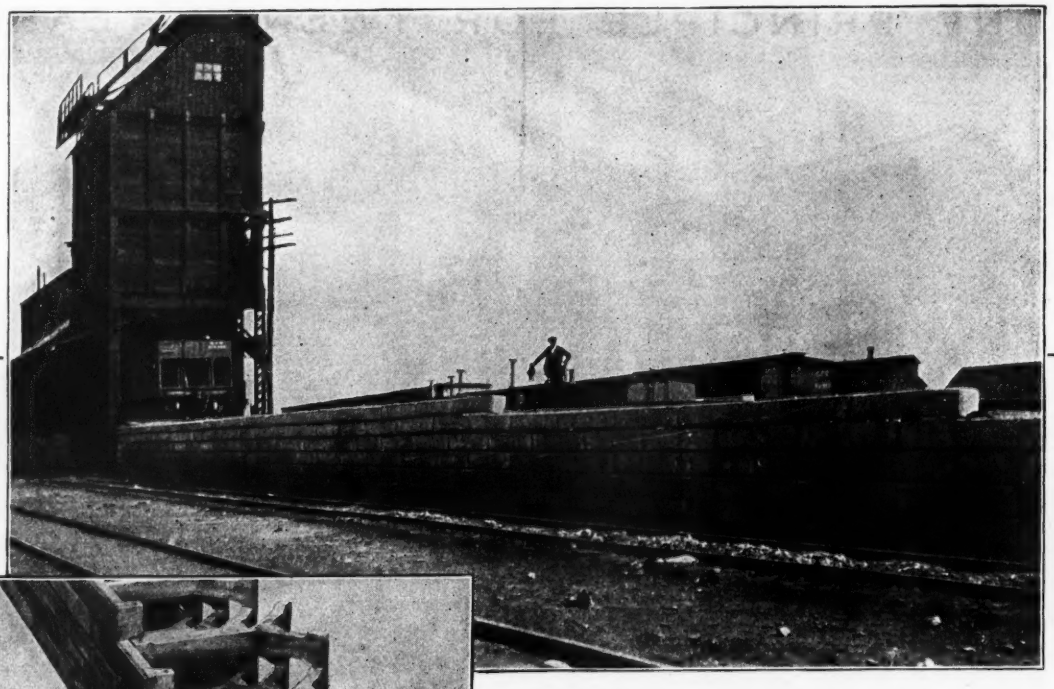
FAIRBANKS, MORSE & CO., *Chicago*

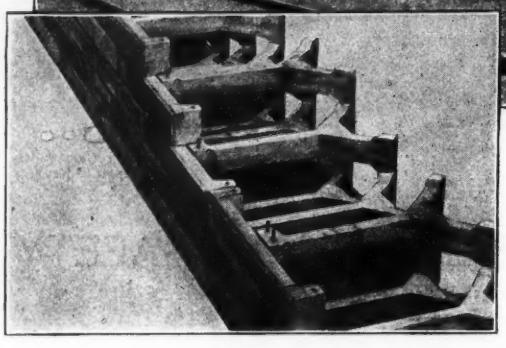
Manufacturers of railway motor cars, section cars, push cars, velocipedes, standpipes for water and oil, tank fixtures, oil engines, electric motors, steam, power and centrifugal pumps, scales, complete coaling stations.

FAIRBANKS-MORSE
MOTOR CARS

First on the rails —and still first

A 852—ARA21.10





A Federal Concerte Crib Wall consists of two substantial units, thus eliminating the usual third member in the backfill. The Y-shaped header ends form a rear wall of cellular construction securely locked in the backfill. The stretcher or face members interlock with the headers, forming a retaining structure of great strength, economy and attractive appearance.

This Cribbing Easily and Quickly Installed

FEDERAL Concrete Cribbing Units have proved that they are easier to install than any other type of retaining wall. Permanent, but can be easily relocated with practically 100 per cent salvage; economical in first cost, improve with age and require no maintenance. A one-inch continuous slot assures free drainage with no possibility of backfilled material filtering through. Illustrated above is an installation at Chicago for the Grand Trunk.

For further information write to

FEDERAL CEMENT TILE COMPANY

608 South Dearborn Street, Chicago, Illinois

FEDERAL CONCRETE CRIBBING

Is Your Road in the 225 Class?

RECORDS of the annual tie renewals of the country's leading railroads show that some great systems have annual renewals of only 125 ties per mile of track while others, with similar traffic and weather conditions, and with tie treatment in effect for about the same time renew as many as 225 ties per mile.

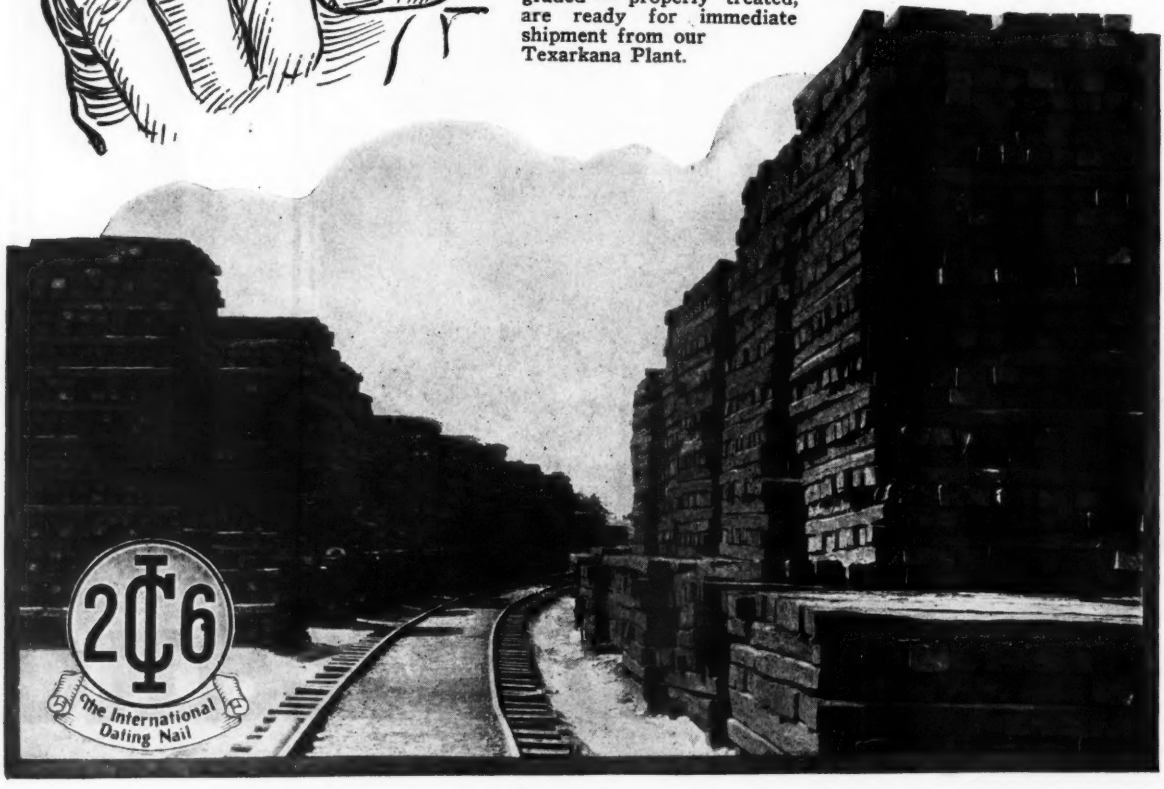
Is your road in the 225 class? If so, this difference is costing you at least $275 more per mile per year for maintenance. It is due most commonly to either unsound timber or improper treatment.

Why spend $2.75 to put a defective tie in your track, even though treated, if it gives only 6 or 7 years life, when by using sound, decay-free timber, properly treated you can get from 18 to 20 years life, or more.

International can ship full size, sound ties, properly seasoned and thoroughly treated, in any quantity. They will last in your track.

International Creosoting & Construction Co.
General Offices— Galveston, Texas

These high quality ties— sound timber A. R. E. A. graded — properly treated, are ready for immediate shipment from our Texarkana Plant.



The Kalamazoo "16 L" Motor Car

—a rugged, powerful little car, strictly one-man in operation but with ample seating capacity for two men.

ON TIME
With KALAMAZOO Motor Cars

When you start out in the morning on your motor car, you allow yourself just so much time to reach your destination. It's up to the car to get you there—on time.

And that's when you need the never-failing dependability of Kalamazoo Motor Cars. For over 35 years Kalamazoo power-driven cars have been bringing railroad men to their destinations and back again — on schedule.

Kalamazoo Motor Cars are made in several sizes with seating capacities ranging from one to thirty men.

Let us send you information on our **complete** line of railway motor cars.

"Kalamazoo Means Service to You"

The Kalamazoo "23" Motor Car

is constructed throughout on the principles of Safety, Comfort, Ruggedness and Power—qualities which are characteristic of every Kalamazoo Car. The "23" is a section car seating 8 to 10 men—and is so well balanced that two men can remove it from the track. It will also handle loaded trailers. Safety rails and powerful 4-wheel brakes are standard equipment.

The Kalamazoo Line
What It Means to You

The name Kalamazoo on any car is a guarantee of quality. Our factory has developed the most modern line of railway motor cars, embodying the latest improvements in automotive engineering. Each car is designed to give a maximum of service with a minimum of maintenance expense.

We manufacture also a complete line of Hand Cars, Push Cars, Rail Cars, Velocipede Cars and Trailers, Electric Crossing Gates, Rolled and Pressed Steel Wheels, Wood Center Wheels with Steel Tires, Moore Track Drills, Gauges and Levels, Wood Cattle Guards, Steel Cattle Gards—in fact a complete line of maintenance of way equipment.

KALAMAZOO RAILWAY SUPPLY CO.

Kalamazoo, Michigan, U. S. A.

Established 1884

New York Chicago St. Louis St. Paul New Orleans Denver Spokane
Seattle Portland, Ore. Havana London Mexico City Johannesburg
Vancouver Winnipeg Montreal

This battle-scarred veteran of thirty-five years' coal-handling for the Reading Company at Port Richmond terminal began its service in 1891 by breaking an unloading record—forty-two cars of coal in one day—and it could repeat this performance tomorrow.

In the same yard, another McMyler-Interstate crane of the same type has just completed its thirty-third year of service. These cranes have handled more than 7,000,000 tons of coal and are still paying dividends on the best equipment investment the Reading Company ever made, and they are still far from the scrap pile.

This record disproves the popular belief that most cranes are equal. Perhaps they are, for the first five or ten years, but during the second and third ten years the true caliber of the equipment comes to light.

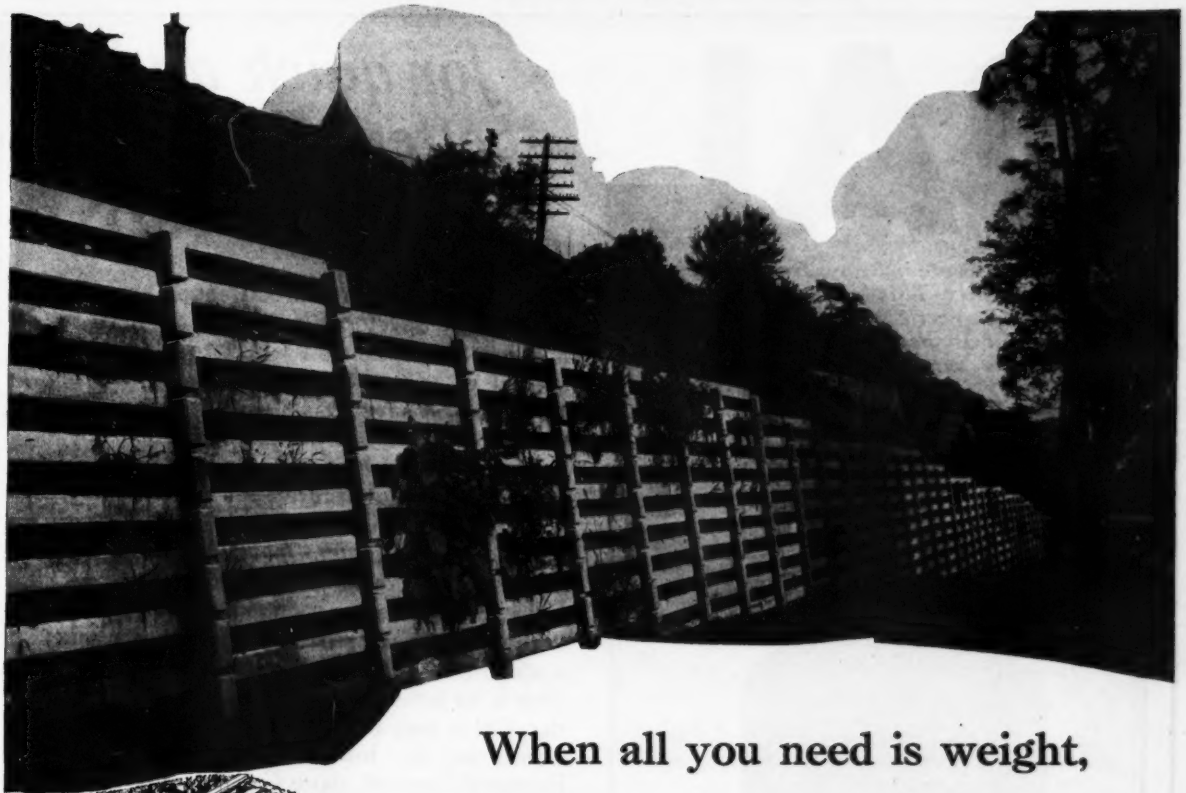
That is why operating officials are more and more placing McMyler-Interstate at the head of their crane recommendations.

They insure their roads of a sound investment by doing so.

G-4

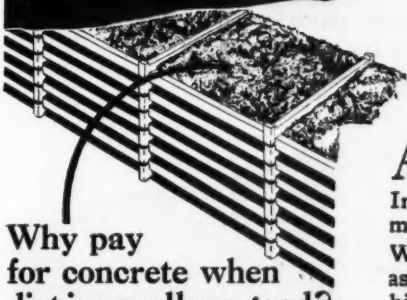
McMyler-Interstate

CLEVELAND, OHIO



When all you need is weight,

dirt is as good as concrete



Why pay for concrete when dirt is equally as good?

Massey Cribbing is produced in the same plants and is of the same high quality as Massey Culvert Pipe and other precast concrete products which have been standard construction on the leading railroads for years.

A GRAVITY retaining wall is defined as one "in which the stability is derived from its own mass or weight."

In a concrete cribbing wall, the stability is derived from the combined mass or weight of the concrete units and the filling material.

When properly confined, dirt adds weight to a wall just as effectively as concrete and is considerably cheaper. A typical gravity wall 16 ft. high, for example, has 630 cubic yards of concrete per hundred feet of length. Contrast this with the 87 cubic yards in a Massey cribbing wall for the same location.

The Massey cribbing is just as stable as the gravity wall for it has the necessary weight. The concrete in Massey units is better than that in a monolithic wall because it is made under ideal factory conditions by an organization of specialists. This high quality concrete means a wall of long life.

Economy, stability, and permanence are all combined in a Massey concrete cribbing wall. Let our engineers discuss specific applications with you.

MASSEY

CONCRETE PRODUCTS CORPORATION

Peoples Gas Building, Chicago

Sales Offices: New York, Atlanta, Cincinnati, St. Louis, Los Angeles

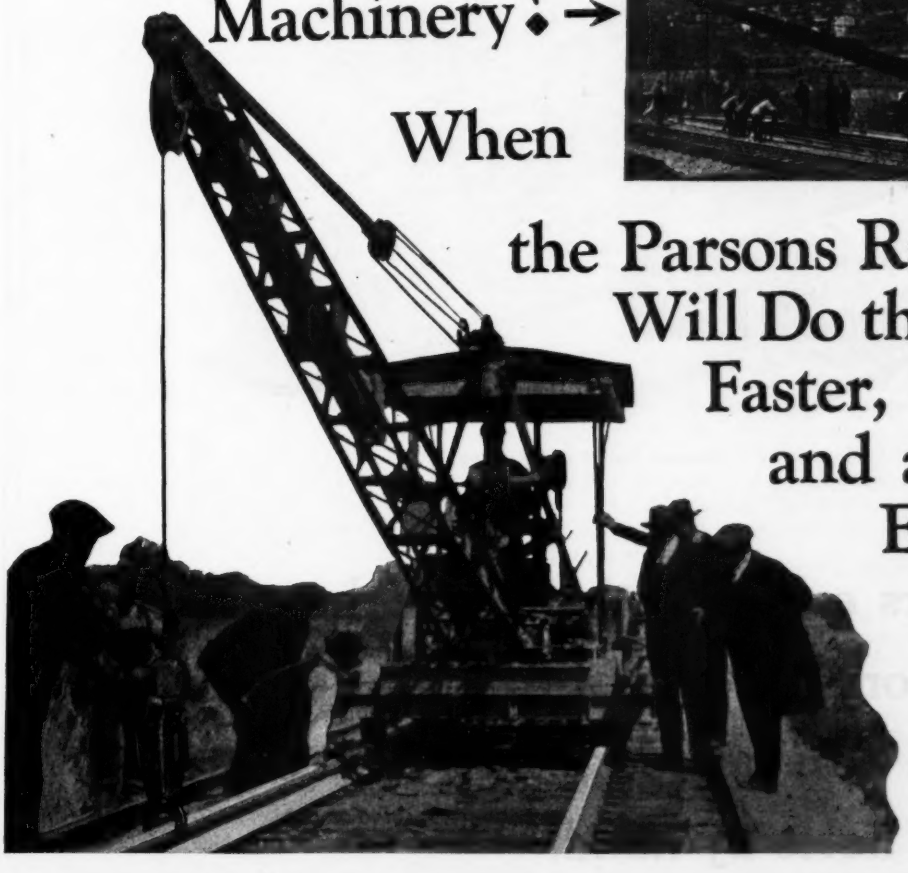
Canadian Concrete Products Co., Limited, Transportation Building, Montreal, Que.

Factory-Made REINFORCED CONCRETE PRODUCTS

REM 12-Gray

Why Pay the Extra Cost of Hand Labor or Oversized Machinery?

When the Parsons Rail Crane Will Do the Work Faster, Safer, and at Less Expense



The worm-gearing on the boom-swing, the positive operation of the hoist mechanism, the operator's clear view of the rail — these are three of the important reasons why the Parsons Rail Crane has made rail-handling safer than ever before.

WHEREVER direct cost comparisons are made, the Parsons Rail Crane is replacing old-fashioned hand-methods of handling rail. Maintenance-of-way engineers who are using the Rail Crane can tell the three big reasons:

1. It is faster by more than 50 per cent (56% according to official figures).
2. It safeguards men against the thousands of accidents caused by hand-handling of heavy materials.
3. The saving in cost actually pays for the Rail Crane in one season.

You will find complete data on the Parsons Rail Crane in our valuable booklet, "The Modern Way To Handle Rail." Sent free to railroad men. Write for your copy today.

THE PARSONS COMPANY, Newton, Iowa, U. S. A.

PARSONS RAIL CRANE

Railway
Engineering and Maintenance

Volume 22 December, 1926 Number 12

THE 1926 INDEX IS READY

THE INDEX of *Railway Engineering and Maintenance* for the 12 issues of 1926 is available for distribution and will be sent without charge to those who request it. Subscribers who bind their copies or those who for other reasons desire to have this index are asked to advise the circulation manager, 30 Church Street, New York, to this effect and it will be sent promptly.

COSTS NOW AND THEN

IN AN article on page 518 J. M. Gibbs takes exception to an editorial entitled "Mechanical Equipment in Bridge Work" which appeared in the February issue of *Railway Engineering and Maintenance.* Mr. Gibbs offers evidence to show that bridge maintenance work is conducted as economically today as it was 20 years ago. Costs are higher, he contends, because labor rates are higher and bridges are of heavier construction. We agree that his contention is correct. We believe also that bridge carpenters are just as intelligent and industrious today as they were in past years and that their work is being directed with just as much, if not more skill, than formerly. What the editorial in question was designed to bring out, and what Mr. Gibbs confirms, is that bridge work is done with much the same tools and equipment today as were employed 20 years ago. In view of the marked advance that has been made in the use of power tools by others in this industrial age, it would seem that the bridge and building department has not kept up with the procession.

IT IS TIME TO TAKE ACTION

LIKE Mark Twain's comment on the weather, to the effect that "While everybody is talking about it, nobody appears to be doing anything about it," the problem of providing an efficient corps of foremen and supervisors for the future has long been before maintenance officers but relatively few roads have inaugurated any measures to solve the problem. The impression prevails in many quarters and with much foundation that the quality of supervision of maintenance forces is declining and that the immediate future holds little promise of improvement. Yet this condition is accepted with an air of resignation and helplessness that is surprising in view of the resourcefulness displayed in solving other problems. As a result relatively little effort is being made to combat and correct this tendency. One of the outstanding exceptions to this attitude is the Delaware & Hudson where definite plans have been developed and put into operation for the purpose of stimulating ambition among the more capable men in the employ of that road and of providing a means of training these men for greater responsibility. While this plan may possess many shortcomings and be open to serious objection, it is so far ahead of the practice of most roads that it is entitled to special consideration.

One out of every five men employed on the railways is enrolled in the maintenance of way department. The numbers exceed 400,000, a vast army of men. The need for intelligent direction of a force of this size is self-evident. Able leadership at the head of the department is essential. Still more important, however, is the intelligent direction of these men by the foremen immediately in charge of them for it is through this direction that the work is really done and the efficiency of its performance determined. No more important avenue for the improvement of the personnel of the maintenance of way department can be devised than the more careful selection of men with the qualifications for foremen and the training of these men in the intelligent, efficient performance of their duties. Work such as the Delaware & Hudson is doing may well be studied by other roads.

CAN YOU AFFORD TO OPERATE IT?

AT THIS season of the year it is the common practice of many roads to bring their steam shovels, pile drivers, locomotive cranes and other work equipment into the shops for overhauling. This affords an opportunity for the thorough examination of the equipment to determine the repairs necessary to restore it to good operating condition. It is also the custom of many roads to make up their budgets for expenditures for the new year at this season, in which budgets provision is made for work equipment together with other expenditures.

In the preparation of these budgets consideration is commonly given to the need for additional equipment and to a lesser extent to the replacement of that worn out in service. Little thought is given, however, to that which is still in serviceable condition to determine whether it should also be replaced because of its having become obsolete. Yet much equipment is in service today which could be replaced with newer and more modern equipment with profit by reason of the reduced cost of operation of the newer designs. In other words, the old equipment is too expensive to operate.

This condition prevails throughout all branches of railway service. It is evident in locomotives as well as in pile drivers, in machine tools as well as in pumps. Yet the loss by reason of the unnecessarily high cost of operation continues the drain on railway revenues without being realized. It constitutes a

challenge particularly to the engineering department because of the recognized practice of this department of analyzing its operations on the basis of ultimate cost. Every unit of equipment in service should be put to the test in comparison with the best modern equipment available, at regular intervals, to determine whether it is an aid or a drain. Only when this is done will the engineering department be operated on the most economical basis. It is not sufficient today to be able to show that the equipment performs the work more cheaply than can be done by hand. Rather, the test is to determine that the equipment employed is performing the work more cheaply than can be done by any other method.

ORGANIZATION FOR THE EMERGENCY

THERE ARE few railway officers who do not appreciate the value of a trained organization as a potent means of accomplishing results in the most orderly manner and with the least expenditure of money and effort. Desirable as such an organization is in regular work, it is even more essential in meeting emergencies, particularly those which interfere in any way with the regular movement of traffic. Emergencies are many on the railroads and to meet them successfully usually costs an abnormal amount under the most favorable conditions. Unfortunately it is not always practical to formulate an organization of forces in advance to meet all of the emergencies which arise, mainly because of their wide variation in character, infrequency of occurrence and scattered locations. Fortunately, however, this does not apply to possibly the most acute emergency which is experienced on many of the northern railroads—the severe snow storm. This emergency may be short in duration, but while it exists it calls for all of the executive ability and organized physical energy that can be amassed to cope with it.

It is assumed that on such roads as are affected by snow storms, brooms, shovels, salt and such other snow fighting tools and materials will be on hand, provision will be made to keep the more important switches open, and that plows, flangers, sweepers and other similar equipment will be in readiness, but what about the organization of the snow fighting forces? Has this most important item of preparedness been given the serious consideration it warrants?

That at least some of the roads consider this matter of vital importance and can make answer to this question in the affirmative is clearly evidenced by the description of the manner in which the Pennsylvania prepares for winter storms in the New York terminal area, which appears elsewhere in this issue. As outlined in this description, each fall the New York division of the Pennsylvania publishes in booklet form and distributes to its men what it terms its "Program for Keeping the Road Open for Traffic During Snow Storms." Included within this booklet is a complete outline of the road's snow fighting organization of men and equipment.

The program itself is important, but having it in the hands of every employee concerned gives it increased value, for when a storm breaks every man knows the part he is to play without instruction, which enables the formation, automatically, of a coordinated organization of men and equipment in mingram.

That this method of organizing and instructing forces in advance for storm duty is practical and efficient is testified to by the Pennsylvania division officers, and furthermore, by the fact that it has now been followed on this division for several years with marked success. Will such a practice, or one of similar detail, work equally as well on other roads? This question may well be given consideration by other railway officers who find themselves preparing for winter storms under a less thorough program.

PUTTING SCIENTIFIC DISCOVERIES ON A REAL PRACTICAL BASIS

OUTSIDE the field of purely mechanical devices, little progress is made in industry in these days without the aid of scientific research. However, it often happens that the general application of a scientific discovery suffers a serious delay until some practical means has been devised for putting the idea into every-day use. This thought may be aptly illustrated by the current developments in the proportioning of concrete.

For many years sand and stone were mixed with cement to form concrete on the theory that the strongest concrete would be produced if the amount of cement was just enough to fill the voids in the sand and if just enough of this cement-sand mortar was used to fill the voids in the broken stone or gravel pebbles. This idea had general acceptance until about eight or nine years ago when studies of thousands of tests made under the direction of the Portland Cement Association led to the discovery of the water-cement ratio which is briefly as follows: So long as the sand and stone are clean and sound and the resulting mixture is workable, the strength of the concrete is affected only by one condition, namely, the amount of water used with each sack of cement.

Workability or consistency of the mixed concrete is influenced by the amount of water in the total mixture and by the grading of the particles and the relative proportions of cement, sand and stone, so in trying to find a practical way of applying the water-cement ratio, a large amount of study was given to the development of tables, charts and formulae which could be used to take into account the ratio of the water to the cement, the proportions of sand and stone, and the grading of the particles as well as the workability as measured by the so-called slump test for the purpose of fixing the correct proportion of cement, water, sand and stone to give a desired strength of concrete with any given set of materials.

As a result of this investigation, a method was developed which involved a considerable use of mathematics. The method is decidedly formidable to one who has not thoroughly studied it. Many to whom it has been proposed have shaken their heads and said that it was not practical, but the fact remains that this method has been applied successfully, notably on a large amount of concrete work done by certain railroads, the Big Four, the Pennsylvania, the Central Railroad of New Jersey and the Louisville & Nashville being leaders in this development. The results obtained on these roads and others proved beyond doubt that the method was sound and that it could be applied on a practical basis. However, it remained clear that its application required a knowledge of mathematics and many contended that it was suitable only for large work where it was possible to have the proportions under the control of a man of engineering training.

Finally it occurred to someone to ask if the idea

of the water cement ratio could not be applied with some rough and ready methods to secure approximately the same results, and when the answer was given it was about as follows: To get concrete that will give a strength, say, of 2,000 lb. per sq. in. at 28 days, use 6¾ gal. of water with each sack of cement. Then determine by trial batches the best proportions of sand and stone to use with the cement and water to get a workable mix. The more carefully that this is done, the more sand and stone it will be possible to use with each sack of cement.

This, in a word, is the practical application of a scientific principle. There are, of course, other things to take ino consideration such as the water already in the sand which ought to be deducted from the mixing water used; also the bulking effect of the sand. The more rigid method has the advantage of greater accuracy and is of advantage on large jobs because it will enable the engineer to determine just the proportions to use that will give the greatest yield, that is, the largest volume of concrete of a given strength for each sack of cement, but for practical purposes on a small job, the brief outline given above, with a few supplemental suggestions, are all that are necessary. Thus, a scientific principle has been put on a practical basis. Undoubtedly better methods will be devised some day. Even the law of the water cement ratio may be subject to some modifications, but at this time it appears to be the most certain way of obtaining better concrete.

AUTOMATIC MACHINES WILL NOT REPAIR THEMSELVES

THE USE of automatic pumps for draining track elevation subways such as are described on page 500 offers a solution of a problem which is of vital concern to some maintenance officers but will not be of direct interest to many others, although with the pressure now being imposed on the railroads for grade separation, railway officers will be confronted with it with greater frequency. However, the automatic feature is being given increased attention in developing new layouts for water service facilities and in this connection some of the points raised in the article mentioned above are of interest to every man who has to do with water service.

Of particular significance is the special stress placed on regular inspection as a vital necessity for the successful operation of these plants and surely this applies with no less force to automatic pumping stations employed on railroads for locomotive water supply. It has been well said that "you can't eat your cake and have it too." So while the installation of automatic machinery in pump houses eliminates the pumpers, it does not permit of a saving equal to the total wages of the pumpers because the attention which the pumpers had been giving these plants must be replaced in part by inspection by others. Unless this is done effectively and regularly, automatic operation will not be a success for no machinery is so perfect that it will operate month in and month out without developing some defective conditions that require correction.

The advantage of the automatic plant over the manually-operated plant lies in the fact that it replaces a large amount of unskilled or semi-skilled labor with a relatively small amount of skilled labor. Indeed, the class of labor ordinarily employed to operate non-automatic plants is such that a certain amount of supervision by inspectors or others is necessary to insure that the defects which the pumper would easily overlook, will be discovered before serious damage is done. Furthermore, pumpers can be trusted to make only the simplest of adjustments and repairs. Because of this, automatic plants require but little more skilled attention than is now given to non-automatic plants, but it is important that the necessity for such supervision is not overlooked.

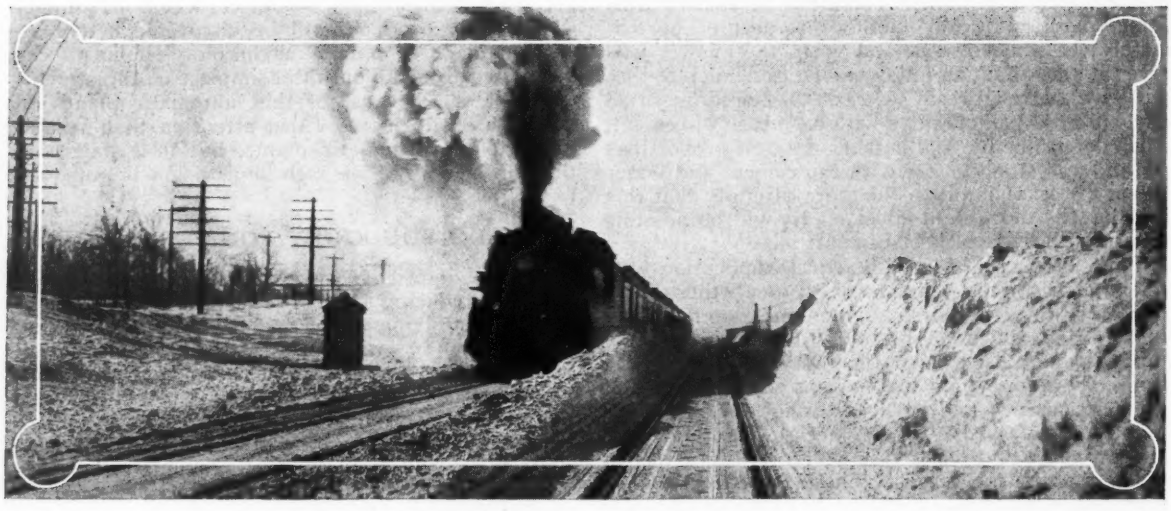
DO YOU KNOW YOUR COSTS?

MANY industries have effected large economies by reducing the costs of their various operations by studying those operations intensively and selecting the best of several methods for use by all. In spite of the success that has attended these efforts elsewhere, the railways have made relatively little use of them, particularly as applied to maintenance of way operations, in spite of the fact that many of these tasks lend themselves to such analysis by reason of their repetition. An outstanding exception is the St. Louis-San Francisco which has been developing such a method of cost analysis for two or three years, as described in *Railway Engineering and Maintenance* for September, 1925, page 345, and November, 1925, page 433.

In an article published on page 502 of this issue, J. M. Sills, division engineer of this road, brings the results up to date with particular reference to the renewal of ties. In this article he reports that the cost of renewals has been reduced from 35.5 cents per tie before these studies were inaugurated to 27.8 cents for the first five months of this year, a saving of 21 per cent, or of $7,622 in out-of-pocket expenditures on this one division for this five months. When extended throughout the entire tie renewal season and over all of the divisions of a railway, the importance of this reduction in unit costs can be realized.

That such savings are possible in maintenance of way work is evident when one considers the hit-and-miss methods that prevail from gang to gang on the railroads. The work that the Frisco has already done demonstrates forcibly that great economies are possible when each important operation in maintenance receives the attention that is being given to the renewal of ties on this road. There is nothing unusual about the Frisco figures. The original cost of 35.5 cents per tie is fairly typical of the cost today on most roads where "a tie per man per hour" is still a common schedule. That the reduction in the cost of this one operation has not been at the expense of other work is shown by the fact that other maintenance costs, such as spotting track, tightening bolts, etc., are showing a similar tendency to decline, indicating that these reductions are the result of an intensive study of methods.

The work which the Frisco is doing is a striking demonstration of the need for the more thorough and analytical study of the methods under which maintenance work is being done and of the influence of these methods on costs. This is requiring a different manner of approach than has prevailed in the past where the first and often the only objective has been to "get the work done." The conditions under which the railways are now operating are making it increasingly necessary to "get the work done at a minimum cost," and that maintenance officer will serve his road best who studies his operations from the standpoint of costs, analyzing and comparing one method with another and selecting that which yields the desired quality of work at the minimum expense.



How a Road Prepares for Winter at a Large Terminal

A Description of the Manner in Which the Pennsylvania Meets This Problem at New York

WITH winter approaching with a rapidity and violence no one can foretell, it is interesting to compare the activity and planning which is already well under way on the different railroads in the large terminal areas in preparing to meet the snow and sleet storms which invariably appear. A heavy snow storm is a nightmare to a railroad under the most favorable conditions, and in most instances involves a large expenditure of money and effort. Out on the line it may cause serious delay to through trains and patrons and interfere generally with both passenger and freight traffic, but serious as this may be it is hardly comparable with the effects of such a storm at a terminal where, unless met with well organized and properly equipped forces, it causes havoc to railroad operation, disorganizes service, delays and inconveniences hundreds of thousands of commuters and through passengers, and disrupts the regular daily delivery of milk and foodstuffs upon which these territories depend.

While such a storm might so affect a large number of roads entering a terminal like New York, it is doubtful if any road, unprepared, would be more seriously affected than the Pennsylvania, with its extensive and intensively-used facilities through which it gives service to thousands of commuters and through passengers daily through its Jersey City and New York terminals. In giving this service and in handling its regular freight traffic, this road operates some 640 passenger trains and about 123 freight trains on its New York division every 24 hours, and maintains 1,032 miles of tracks and 3,394 switches which must be kept open regardless of storm conditions.

The first actual preliminary steps are taken early in November, when a letter is sent from the division engineer's office to all supervisors of track, the master carpenter and the supervisor of telegraph and signals, directing them to check up on the snow fighting equipment and supplies of each of their foremen to see that they have an adequate number of serviceable snow shovels, picks and brooms on hand, and a sufficient supply of snow melting oil, salt and sawdust to meet any emergency. In accomplishing this the supervisors require their foremen to make a check of their equipment and supplies and to send in a report. Each supervisor also calls a special snow meeting of his foremen, where the usual and special problems of fighting snow and sleet storms are discussed in detail, and where definite programs are outlined so that each foreman knows the specific territory to which he is assigned and the duties he is expected to perform. The foremen are also instructed with regard to the handling of the extra men who may be assigned to them, the keeping of special time rolls, the plan of feeding the men, and all such other items for which there will be little time for instruction when an emergency arises. At these meetings the foremen are also cautioned to see that the finishing touches are put on their track for the winter season, and at the proper time, to see that their switch heaters and other snow melting devices are in place and in operating condition, or are ready for immediate installation.

In this way there is no misunderstanding as to what is to be done in preparing for storms, or how it is to be done. Brooms and shovels are supplied, sand, salt and sawdust are provided for use around switches, and an ample supply of snow melting oil is furnished for thawing out switches and for removing the snow from about them. These supplies are stored in an orderly manner at points where they will be readily available for use, it being the practice in the case of salt, sand and oil, to provide suitable containers at the various points where these supplies will be in the greatest demand during the periods of stormy weather.

While awaiting the receipt of the requisitioned material, one of the most important precautionary steps to meet winter conditions is taken—a check-up on the drainage conditions about switches, track pans, water tanks, and at all other places where the formation of any appreciable amount of ice will interfere with operations. This also includes the cleaning out of ditches, culverts and drain pipes so that minimum interference will be afforded to drainage. At this time also, from November 1 to the middle of December, the important switches are prepared to receive switch heaters, this consisting in the main of cribbing out from beneath the switch points so as to permit the ready placing of these units. In the latter part of this period the heaters are installed, these being of several types, including perforated steam pipes, used to some extent near power houses or other points where steam is available at low cost; gas heaters which are connected by underground piping direct to gas mains; and electric heaters which are connected to suitable power circuits. Another type of heater used extensively, but not installed in advance of storms, is the oil burner. This type consists essentially of a number of individual pans or trays which are set in place under switch points and filled with oil which is ignited when snow or ice begins to accumulate. With the switches prepared in advance for the setting of these pans, little time is consumed in placing them when it becomes necessary to use them to fight the snow.

Other Departments Also Organized

While the track department is making ready to meet its end of an emergency, all other departments concerned, upon instructions from the division superintendent, are organizing their forces and putting their snow fighting equipment in condition. This latter consideration is of special importance in the mechanical department which is responsible for the preparation and the operating condition of the equipment moving upon the tracks. With chloride cars for use in keeping the third rail free from ice and snow, and with flangers, snow plow cars, pilot plows, steam blower equipment for locomotives, and a snow sweeper, for general use on main tracks in yards, a large responsibility and considerable work is involved, for each unit must be carefully overhauled and tested to insure that it is in proper condition for immediate service. Another unit under the care of the mechanical department is the emergency train stationed at the company's Meadows shops in New Jersey. This train has sleeping capacity for 135 men and facilities for serving 300 warm meals per hour.

In addition to preparing all of this equipment for immediate service, the mechanical department prepares for the ready dispatch of suitable power to move the equipment, and arranges with the store department to see that adequate quantities of salt and chloride are on hand and that sufficient brooms and shovels are available for its men, who, to a large extent assist in keeping open the tracks and switches in the vicinity of shops and engine houses.

A Printed Program Insures Organization of Forces

With the track in condition and with all tools and equipment in readiness, the principal problem remaining in preparation for winter storms is that of the organization of forces and equipment, which is an item of the greatest importance. In meeting this problem the New York division of the Pennsylvania follows a practice which not only arranges the organization of its forces and equipment in advance of storms, but one which insures that nothing but disregard of instructions can cause a breakdown. This practice is that of publishing and furnishing to every supervisory officer a special notice in booklet form entitled, "Program for Keeping the Road Open for Traffic During Snow Storms." The scope of this booklet in definitely prearranging a workable organization with the duties and jurisdiction of each officer prescribed and with full details regarding the location and operation of equipment, is best understood by reference to its index which is shown herewith in substance.

Index

The first item, the telephone directory, is without question one of the most important in the booklet, for here, listed in alphabetical order are the names, positions, residences, and the office and home telephone numbers of all the maintenance of way, mechanical and operating supervisory officers on the division with whom it may be essential to get in touch promptly in case of emergency. Items No. 2 and 3 begin that section of the booklet showing the definite distribution of forces during snow storms. Starting with the engineering force of the division engineer there is listed the name, address, day and night call and the assignment of each man, which not only makes apparent at once the force available from this department and a means of getting in touch with each man at any hour of the day or night, but of no less importance, the specific point at which he must be stationed when on storm duty. An examination of the assignment made in the engineering department shows that these men are detailed largely to duty in the division engineer's office to assist in the handling and placing of the extra forces employed during a storm, and as assistants to the various supervisors where they perform more or less similar duties.

Other Features of the Program

Item No. 3 lists the location, call number and jurisdiction of each supervisory and assistant, the most important listing being a specific statement of the territory for which each supervisor is responsible under storm conditions. Items No. 4 to No. 7, inclusive, refer to pages which give the name, section number, number of men, call, address and duties of each foreman and assistant foreman under various supervisors, the duties indicating specifically the territory which the foreman and his men must keep open. The next five items of the index refer to the personnel, calls, addresses and assignments of the forces of the master carpenter, master mechanic and supervisor of telegraph and signals, the information being tabulated in the same manner as that referring to the track department. Item No. 13 includes a list of the contracting companies on whom the Pennsylvania relies for extra forces during

DISTRIBUTION OF FORCES DURING SNOW STORMS.

OFFICE OF DIVISION ENGINEER.

R. C. MILLER, Division Engineer, Residence, 79 West Hazelwood Ave., Rahway, N. J.
Day Call: Personal 715, Office 710, 713, 714, 521, 522, 523. Night Call: Rahway 741-R.

In the absence of Division Engineer, call
W. R. FINNEGAN, Chief Clerk, Residence, 104 Senior St., New Brunswick, N. J.
Day Call: Personal 713, Office 710, 714, 521, 522, 523. Night Call: New Brunswick 2888-M.

DISTRIBUTION OF DRAUGHTING ROOM FORCE

NAME—POSITION.	ADDRESS.	DAY CALL.	NIGHT CALL.	ASSIGNMENT.
David Collins, Asst. to Div. Engr...	11213 Eighty-sixth Ave., Richmond Hill, L. I....	717-718 J. C....	Rich. Hill 0114-W..	Division Engineer's Office.
H. B. White, Draughtsman.....	126 Curtis St., Linden, N. J.	717-718 J. C....	.....	Division Engineer's Office.
J. C. C. Fischer, Draughtsman.....	545 Marshall St., Elizabeth, N. J.....	717-718 J. C....	.....	Division Engineer's Office.
D. J. Dougherty, Draughtsman.....	P. R. R. Y. M. C. A., Penna. Sta., N. Y. C.....	717-718 J. C....	P. R. R., N. Y. 179	Division Engineer's Office.
D. E. Rudisill. Rodman.....	450 Jefferson Ave.. Elizabeth. N. J.....	717-718 J. C....	Emerson 6641.....	Supervisor No. 2.

ASSIGNMENT OF SUPERVISOR'S DIVISION No. 4 FORCE.

NAME.	SECTION.	NO. OF MEN.	CALL.	ADDRESS.	DUTIES.
O. Mey, Foreman.....	20	15	"CD"—Day ..... "CD"—Night.	Princeton Junction.....	"CD" interlocking switches.
J. McKallen, Foreman...	20½	10	"CD"..... P.R.R. 'Phone to residence.	Princeton Junction.....	"CD" interlocking switches. Platforms at Princeton Junction.

ASSIGNMENT OF MASTER CARPENTER'S FORCE.

B. F. STIDFOLE, JR., Master Carpenter, 117 Rahway Ave., Elizabeth, N. J., Phone 739 Term.-Day. Night, Elizabeth Emerson 9646.
A. W. REYNOLDS, Asst. Master Carpenter, 106 Garrison Avenue, Jersey City, N. J.
Phone No. 737 & 738 Terminal Day Call—Night Call, 1969-R Bergen.
W. R. TAGGART, Asst. Master Carpenter, 609 Newark Ave., Elizabeth, N. J., Phone No. 737 & 738 Term.-Day. Night, Elizabeth Emerson 2924.

NAME.	SUB-DIVISION.	NO. OF MEN.	CALL.	ADDRESS.	DUTIES.
O. R. Reynolds, General Foreman.....	.....	67	Day—124 New York..... Night—Elizabeth Emerson 9179.	202 Rahway Ave., Elizabeth, N. J..	Will assist between "A" and Sunnyside Yard, Interlockings as assigned and Hackensack Drawbridge. After storm will assist on sidewalks adjacent to Co.'s property—look after roofs, etc.

ASSIGNMENT OF SUPERVISOR TELEGRAPH AND SIGNALS FORCE.—(Continued.)

SIGNAL CONSTRUCTION FORCE.

NAME.	SUB-DIVISION.	NO. OF MEN.	CALL.	ADDRESS.	DUTIES.
W. F. Buckelew, Foreman.....	.....	16	Service Plant, N. Y., 25 or 26, N. Y.—Day. 1599-J-Intervale—Night.	1366 Lyman Place, N. Y. C.....	Will be stationed at "S" and his men distributed as follows: "R" Sunnyside —1 man. "Q" " —1 " "P" " —1 " "A" N. Y. Terminal Sta.—4 men. Hackensack Portals —2 " "S" Manhattan Trf. —4 " "N" " —2 " "PB" —1 man.

ASSIGNMENT OF MASTER MECHANIC'S DEPARTMENT AT NEW YORK.

H. K. LeSure, Master Mechanic, Residence, Bayside Boulevard, Bayside, L. I. *Night Call*—2847-Bayside. *Day Call*—130, 131, 167 Penna. Sta.
B. W. Kline, Asst. Master Mechanic, Residence, 419 Westfield Ave., Elizabeth, N. J. *Night Call*—Elizabeth Emerson 7137. *Day Call*—132 or 120 Penna. Sta.

SUNNYSIDE YARD.

H. Mandeville, Genl. Foreman (Day), Phone, No. 77, Penna. Station. J. S. Coulson, Foreman (12.00 midnight to 8.00 A. M.), Phone, No. 79 Penna. Station.
J. K. Sheridan (4.00 P. M. to 12.00 Midnight), Phone No, 79 Penna. Station.

To furnish 25 men equipped with tools to clear platforms, Sunnyside Yard, or to assist in keeping the switches open.

CHLORIDE CARS.

J. Sullivan, Assistant Foreman, Third Rail and Transmission Lines. *Day Call*—N. Y. 137. *Night Call*—Montgomery 4718-J.

Will have charge of Chloride Cars, see General Instructions in this book, page 7.

ASSIGNMENT OF MASTER MECHANIC'S DEPARTMENT, MEADOWS.

F. L. DOBSON, Master Mechanic, Residence, 723 Clifton Ave., Newark, N. J.
Night Call Branch Brook 6751, Day Call 11 Meadows.

G. S. West, Asst. Master Mechanic, Residence, 75 Esterbrook Ave., Rahway, N. J.
Night Call Rahway 656-R, Day Call 16 Meadows.

MEADOWS SHOPS.

New Jersey Division Emergency Train stationed at Meadows Shops.
Train has sleeping capacity for 135 men and two cafe cars which can serve 300 warm meals per hour.

Sample Pages from a Previous Program Book

severe or prolonged storms. Here also are given the day and night calls of these companies, together with a statement of the number of men which each can furnish on short notice and whether or not the men will be supplied with shovels or brooms. The next five items, beginning with No. 14, pertain to the type, location and function of each unit of the snow fighting equipment of the division, giving in detail the conditions under which these units are to be used, the tracks on which they are restricted, the dispatchers responsible for their movement, the names of men in charge, a list of those men qualified to accompany the units, and such other instructions and information as will lead to the prompt dispatch, intensive use and safe operation of each piece of equipment under storm conditions.

The last item in the index refers to a series of special instructions regarding the duties of supervisors, trainmasters, dispatchers and such other employees as switchmen, locomotive engineers, trainmen, etc., who

Hand Labor Is Still an Important Item

are not mentioned elsewhere in the program. Other instructions included are of a general nature, dealing with the method of organizing forces, feeding the men, the manner of reporting conditions during the progress of the storm, etc.

With such a detailed program in the hands of its men, the Pennsylvania has at its command a highly trained snow fighting organization which can take shape in a minimum time. Every man is within call day and night, every man knows his jurisdiction, duties and responsibilities, and all of the equipment is in readiness with unmistakable instructions governing the make-up of its crews, its operation and the territory on which it can be used.

The accuracy of every detail of this program, on which its value depends, is, of course, of the greatest importance. This is assured by the complete re-editing of the program booklet each fall, a copy of the previous year's booklet being sent to each supervisory officer early in November for checking, revision and suggestion with regard to personnel, duties, instructions or any other matter contained therein. When all of these copies have been returned, a new, up-to-date edition is published and copies are distributed to all supervisory officers for their guidance in preparing for and actually coping with storms. For many years this practice has been followed by the Pennsylvania at New York and to it may be credited in large measure the success with which the road has handled snow storms and kept its trains moving.

In spite of these advance preparations, the Pennsylvania never allows a storm to overtake it without advance warning. In making sure of this, weather reports are watched constantly, direct communication is had with the weather bureau office, and the western lines of the road are under instructions to report the advance and intensity of storms from that direction. Before the storm arrives it is possible, therefore, to notify all employees to be in readiness. When snow begins to fall, the men take their places, and if a heavy snow fall is anticipated, the snow fighting equipment is made ready for duty and the contractors furnishing men are notified to be prepared to meet the demand for labor. If the storm should prove severe, the road is therefore amply protected with every man at his assigned position, all equipment in operation, and with extra labor being supplied in an orderly manner.

Next to the organization of the forces and equipment, possibly the practice contributing most to the orderly handling of a severe snow storm by the Pennsylvania in this area, is the manner in which it secures its emergency forces. Fortunately, sufficient labor to fight snow storms has usually been available in this territory, but being fully aware of the magnitude of the task of recruiting, employing, organizing and paying off the army of extra men necessary to meet a severe storm, the road has delegated the brunt of this work to labor contractors. These contractors round up and employ the men, see that they are properly clothed and equipped for work, keep their time and pay them off. In this manner the railroad relieves a large number of its own forces for other duty.

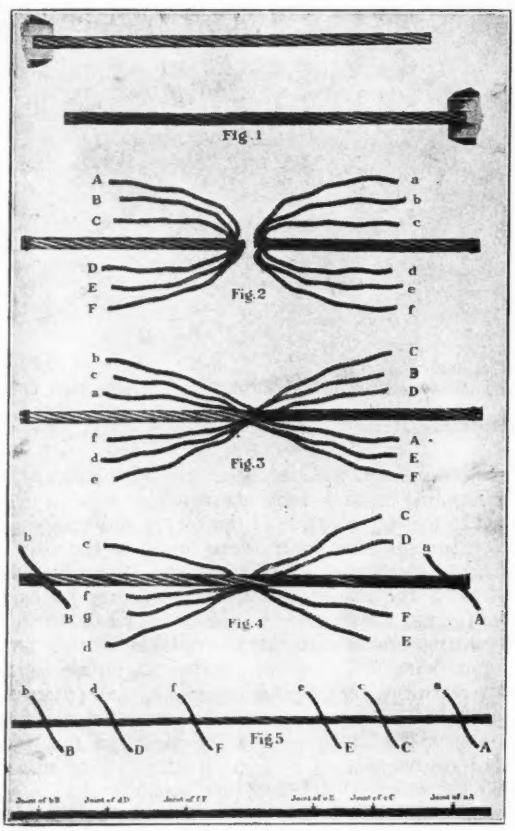
The men employed are assigned to the various supervisory officers or their foremen whose responsibilities are to see that the men work and to keep a separate time roll. The extra forces are fed with the regular employees, either by supply trains or at nearby restaurants where preparation has been made in advance. With this manner of employing and handling the extra forces, there is little other than actual snow fighting going on during a storm.

Take Good Care of Wire Rope

Proper Precautions in Handling Will Make for Longer Life and Insure Against Accidents

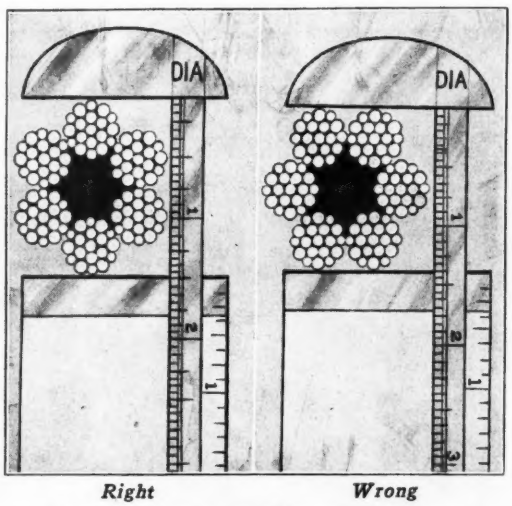
The proper handling of wire rope from the standpoints of both safety and expense is so important that the following abstract of instructions with explanatory illustrations which have been prepared by Walter Voigtlander, rope engineer of the American Cable Company, Chicago, will be of interest and value to all who have occasion to handle hoisting or unloading machinery involving its use.—EDITOR.

THE CORRECT method of measuring wire rope is shown in the accompanying illustration which also shows in contrast the incorrect method. It is highly important to use the proper size of rope since an undersized rope will not give the service demanded while an over-sized rope represents needless investment. It is even more important to have the rope and sheave properly fitted, since a pinching groove will shorten the life of the rope materially, while grooves 1/16 in. larger than the diameter of the rope will lengthen the service life of the rope and as sheaves are cheaper than the rope there is no economy in using improperly grooved sheaves or drums. The diameter of the sheaves or drums also affects the life of the rope and large diameters should be used, when possible, to reduce the bending stresses. Reverse bends should be avoided also, since they diminish the life of the rope.



Steps in the Splicing of a Wire Rope

Wire rope is ordinarily shipped in coils or on reels, and in uncoiling or unreeling it is essential that no kinks be allowed to form, as when a kink is once formed it cannot be taken out and renders the rope unsafe. Wire rope should never be uncoiled by the method used for uncoiling rubber hose or hemp rope but the coil should be lifted on edge and unrolled instead. Similarly when wire rope is received on a reel it should be unrolled by the use of a jack bracket or, if this is not available, the reel should be turned on edge and rolled along the ground.



How to Measure the Diameter of a Rope

Splicing Wire Rope

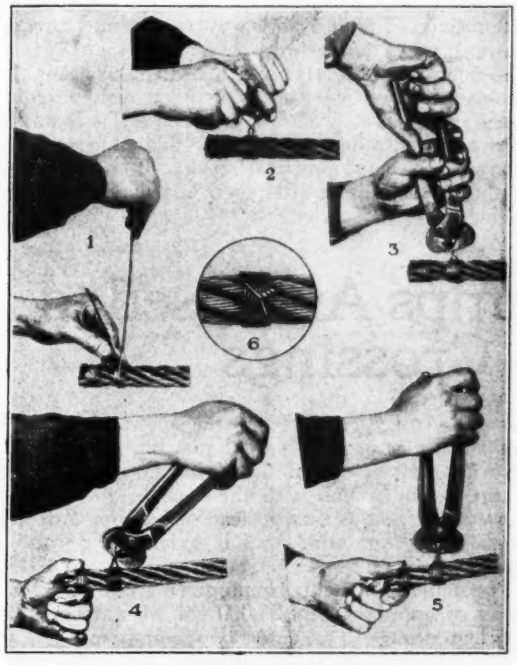
In order to prevent appreciable loss of strength at the splice it is customary to make the splice of a length as shown in the following table for ropes of different sizes:

Diameter of Rope	Length of Splice
½ in.	15 ft.
⅝ in.	20 ft.
¾ in.	24 ft.
⅞ in.	28 ft.
1 in.	32 ft.
1⅛ in.	36 ft.
1¼ in.	40 ft.
1½ in.	45 ft.

In splicing the ropes the ends should overlap to allow the proper length of splice. For the purpose of explanation a 30-ft. splice may be assumed. First, wrap or tie each rope securely with iron wire 30 ft. from the end and unlay all strands 15 ft., cutting away the hemp core to permit bringing the unstranded ends together so that the strands will interlock as in Fig. 3. Next take strand a and unlay it until the wire tie is reached and in the open groove thus formed place strand A, laying it in tightly and making the twist agree exactly with that of the groove, stopping when all but two feet of the strand has been laid in. Then cut off strands A and a so that the ends will be about two feet long. Next unlay strand B in the opposite direction and in its place put strand

b, stopping the ends in a position corresponding to that of A. In like manner replace strand c with C, stopping six feet short of the junction of A and a, and replace strand D with d, stopping six feet short of the junction of B and b. Proceed similarly with strands e and E, and F and f, stopping six feet short of C and c, and D and d, respectively.

The rope will now present the appearance shown in Fig. 5 and the only remaining step is to tuck in the ends in such a way that the diameter of the rope will not be enlarged. This is done by removing the hemp center and putting the ends in the place occupied by the core. To do this it is first necessary to untwist the strands A and a, so that the hemp center can be seized with a



How to Seize a Wire Rope

pair of pliers, inserting a marline spike to keep the gap open. After starting the loose ends into the space left vacant by the removed core they are forced into place by rotating the marline spike. The ends of the other strands are tucked in in the same manner. On completion of the splicing operations the rope should be hammered lightly with a wooden or copper mallet to insure a uniform diameter throughout the length of the splice.

Seizing Wire Rope

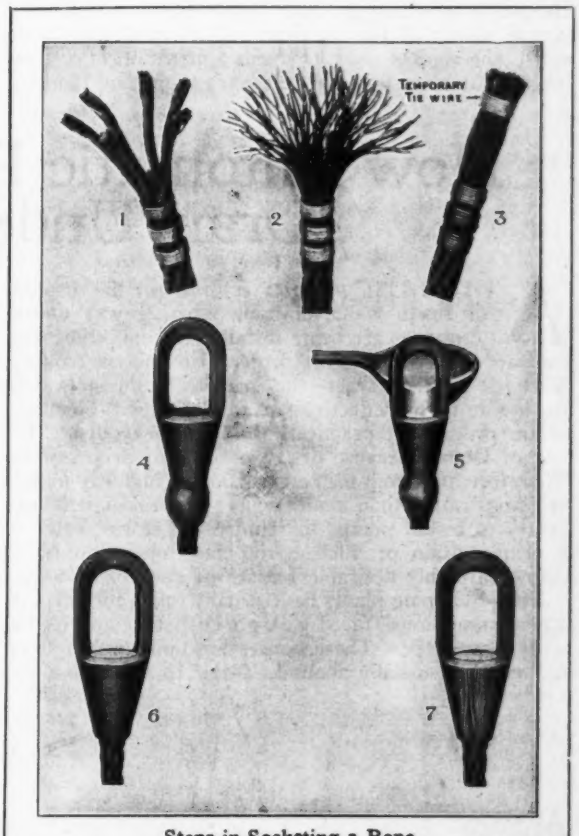
The ends of an ordinary wire rope should have at least three seizings to prevent unlaying which would render the rope useless. The seizings may be replaced by fittings if they are designed to prevent the unlaying of the rope. To apply the seizings the method called for by the United States Government Master Specifications No. 297 is given herewith:

(1) Wind the seizing wire on the rope by hand, keeping the coil together and considerable tension on the wire, winding over from left to right; (2) twist the ends of the wire together counter-clockwise by hand so that the twisted portion of the wires is near the middle of the seizing; (3) using Carew cutters, tighten the twist just enough to take up the slack. Do not try to tighten the seizing by twisting; (4) tighten the seizing by prying the twist away from the axis of the rope with the cutters; (5) tighten the twist again as in 3. Repeat 4 and 5 as often as is necessary to make the seizing tight and rigid. Cut off the ends of the wires, and pound the twist flat against the rope.

The appearance of the finished seizing is shown in Fig. 6. Any annealed low carbon steel wire may be used for seizings, the size ranging from No. 10 to No. 18, depending upon the diameter of the rope.

Socketing Wire Rope

In socketing a wire rope, measure back from the end of the rope a distance equal to the length of the tapered basket of the socket. Tie securely at this point with soft iron annealed wire and add two additional tie wires below the first. Open up the strands as in Fig. 1, cut out the hemp core as far down toward the tie wire as possible and unlay each wire and straighten so as to form a brush. On large ropes and heavy wires it may be necessary to place a small pipe over each wire to straighten or remove the curl from the wire.



Steps in Socketing a Rope

If the wires are very greasy, hold the brush with the wires downward over a pail of gasoline and wipe off the grease with waste or a paint brush dipped in gasoline. Wipe dry, using a clean rag or piece of waste. Dip the brush, still holding the wires point down, into a pot of muriatic acid solution consisting of 50 per cent water and 50 per cent commercial acid, inserting the brush to a depth so as not to immerse the end of the hemp core. Keep in the acid until the wires are clean. Still holding the wires downward, withdraw from the acid and knock the rope sharply with a stick, such as a broomstick or hammer handle.

Place a temporary tie wire, as in Fig. 3, over the ends of the brush, taking care not to handle the cleaned wires with greasy hands or tools and insert the rope end into the socket, then cut the temporary tie wire and set the rope vertically in a vise; adjust the socket so that the wires come flush with the top of the basket of the socket, then spread the wires out. Seal the bottom of the socket with fire clay or asbestos, as in Fig. 4, warming the socket moderately if it is cold.

Pour pure molten zinc (not babbitt, lead or other alloy) into the socket as in Fig. 5. Tap the side of the socket with a light hammer while the zinc is still fluid, so as to jar the zinc into the crevices between the wires. When cool, remove the fire clay and the serving wires, and the finished joint will result. It will help slightly in the flowing of the zinc among the wires to put a small quantity of salammoniac crystals over the wires just prior to pouring the zinc.

Lubrication of Wire Rope

Practically all of the cores of good brands of wire rope are impregnated thoroughly with a commercial, chemically-neutral rope oil. While the core retains a liberal supply of this lubricant which gradually oozes out as the rope is used, frequent application of a good lubricant during service is necessary to prevent the core from becoming dry. A dry core will both wear and crush quicker than an oil-impregnated core and will absorb moisture with the result that the core will deteriorate rapidly and the inner wires will corrode with shortened rope service as the result.

The smaller the sheaves or the heavier the tension on the rope, the more often should the rope be lubricated. A good lubricant retards corrosion of the wires and deterioration of the core, reduces internal friction which is the cause of wires breaking from bending stresses, and decreases external wear. The lubricant should be thin enough to penetrate the strands and the core but not so thin as to run off the rope nor so thick that it merely covers the rope. Therefore, a thicker, semi-plastic compound applied hot and in a thinned condition, is the best wherever possible. It will penetrate while hot, then cool to a plastic filler, excluding the entrance of water, both preserving and lubricating the inner wires and cores.

To lubricate properly with a heated lubricant, it is necessary to run the rope slowly through a tank of heated oil to allow penetration. Where this is not possible, an application of a thinner and unheated lubricant will give good practical results. It is always well to lubricate ropes just after their installation and before putting them in service.

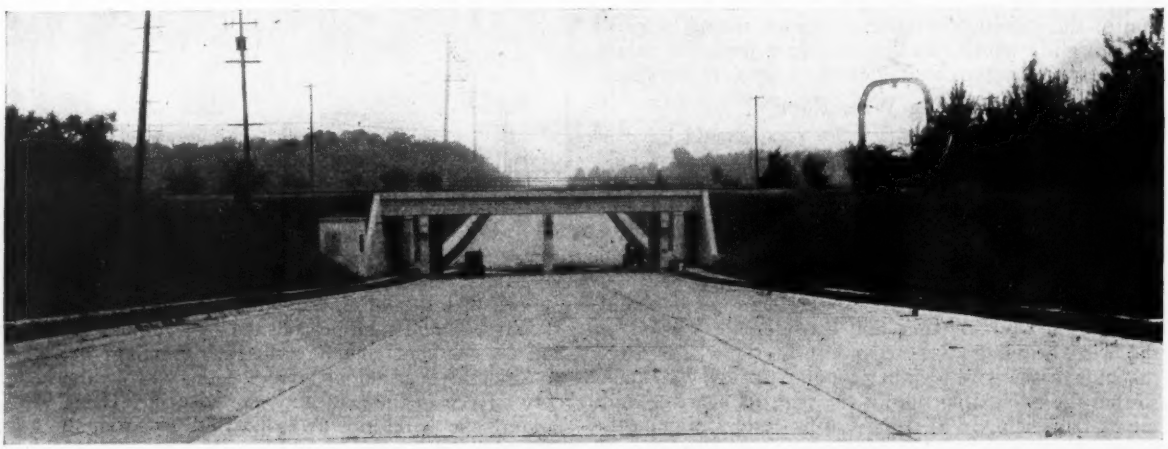
How Automatic Pumps Are Used to Drain Under-Crossings

AUTOMATIC pumping stations for the disposal of storm water draining into highway undercrossings are being installed in connection with railway grade separation projects in Wayne county, Mich., at locations where the roadway in the subway is too low to permit effective natural drainage. This condition prevails in practically all locations outside the city of Detroit because of the absence of deep sewers. Therefore, to permit the construction of highway undercrossings rather than viaducts over the tracks, it is necessary to install pumps to remove the storm water to a nearby drain or ditch. Automatic operation is, of course, a highly desirable feature of such installations.

These pumping plants have usually taken the form of a neat pump house faced with pre-cast stone and roofed with colored tile. These houses are built over a sump or pump pit, usually about 12 ft. by 16 ft. in plan and extending 16 ft. or more below the sidewalk grade. The pump house is usually located just beyond the end of the wing wall of one of the abutments with the front of the house in line with the face of the abutment. However, in many cases, instead of building a detached pump house, one wing wall is extended to form the front wall of the house.

The dimensions of the sump given above afford a capacity of approximately 23,000 gal. of water, which is sufficient storage to take care of the first rush of a very severe shower or to compensate for variations in rainfall involving momentary periods of intense precipitation.

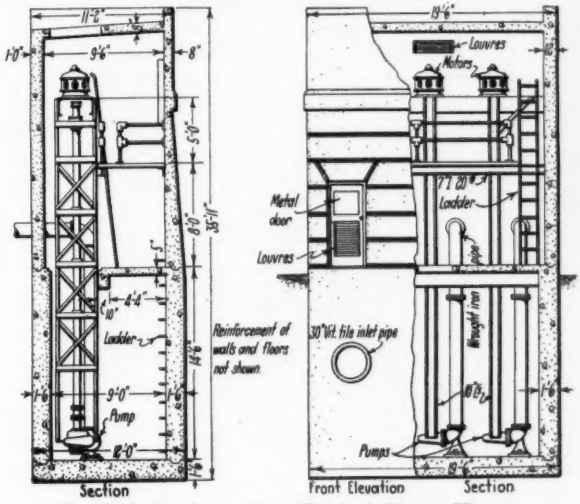
The usual installation consists of two six-inch centrifugal pumps. It is the practice to require these pumps to be built with an eight-inch discharge as well as an eight-inch suction to provide for losses in the



The Pumps are Required to Handle the Run-off from Large Areas of Pavement

elbows, etc., which are necessary in order to deliver the water to a large catch basin located on the natural ground above and outside of the pump house. In exceptional cases, two eight-inch pumps are installed, and in still other cases provision has been made for a third pump which can be installed if experience should show that this is necessary.

The pumps are purchased under specifications calling for a delivery of 860 gal. per min. per pump against a 27-ft. head operating at 850 to 900 r.p.m. The 8-in.



Vertical Sections of a Typical Pump House

pumps will deliver 2,300 gal. per min. The pumps are of the horizontal centrifugal type with vertical shafts and direct-connected motors, it being the practice to specify motors of a slightly larger size than recommended by the pump manufacturers.

The reason that two pumps are installed instead of one is that the control system is such that only one pump is operated unless the volume of water is more than it can handle. The pumps are set about 18 in. above the bottom of the sump and float switches are so arranged that one pump comes into operation when the sump has filled to a depth of four or five feet, while the second pump comes into operation only when the sump has filled to a depth of three or four feet more.

Interior of One of the Pump Houses

Pains Were Taken to Give the Pump Houses an Attractive Appearance

The cost of these pumping plants, including the pump house, pump installation, cast iron discharge pipes and outside catch basins, but excluding all ordinary sewer work in the subway or in the discharge away from the pump house varies from $8,000 to $11,000, depending upon the local conditions, variations in the sizes of the pumps, houses, etc. The cost of electric current for these plants varies with the location and the amount of rainfall, and ranges from $10 to about $30 per month. Automatic equipment of the kind requires periodic inspection and attention to insure that it operates correctly. In Wayne county, with a comparatively small area and with a maintenance organization adequate for the requirements, all of these automatic plants are inspected about once a week as a matter of routine. The cost of this inspection, under the circumstances, is nominal and the repairs are negligible.

It is estimated that the capitalized cost of maintenance, operation and replacement of these pumping plants is about $14,000, this figure being arrived at by the following calculation:

Electric power	$10 per month
Cleaning pump house sump, including truck time. Removing ice, etc., in winter. Repairs to pumps and motors	30 per month
Total	$40 per month
This equals	$480 per year
Depreciation—pumps and motors, $3,600 at 10 per cent	$360 per year
Total	$840 per year

Capitalized at 6 per cent equals $14,000.

It has been the policy of the Wayne county authorities to make the grade crossing structures and approaches as attractive as possible and the design of the pump houses has been carried out in a manner that will add beauty to the subways wherever possible. This is in keeping with the efforts taken to provide and maintain carefully sodded embankment slopes, etc.

About 15 of these pumping plants are now in operation and they have all proved entirely successful. Pumping plants at six crossings on the line of the Detroit, Toledo & Ironton are provided with American Well Works pumps driven by General Electric motors.

We are indebted for the above information to H. A. Shuptrine, bridge engineer, Wayne County Board of County Road Commissioners.

How the Frisco Has Cut Its Tie Renewal Cost 20 Per Cent

By J. M. Sills
Division Engineer, St. Louis-San Francisco, Springfield, Mo.

SINCE the publication of the article entitled, Frisco Studies Various Methods of Making Tie Renewals, in the November, 1925, issue of *Railway Engineering and Maintenance*, further experiments along the same line have been conducted with the object of reducing maintenance costs by improving methods. These experiments are conducted under engineering supervision. Briefly, the procedure is as follows:

1. Daily reports are sent in by section foremen.

2. Monthly summaries are worked up by the accounting department. These summaries show units, hours, total cost and unit cost for each track section.

3. Analysis by divisions is made by the chief engineer's office. Analyses by sections and roadmasters' territories are made by the division engineers.

4. On the Eastern division these monthly cost records are collected on cost sheets, one for each kind of track work, in such a way that a record for each section can be studied over a period of many months and compared with the best records of this section and also with the records of other sections. Office analyses are then made from these sheets at which time apparent errors are run down and corrections made.

5. After this is done, time is spent in the field with the sections whose costs run consistently high or low. Methods are studied and all good methods used by the low cost foremen, providing first-class work has been done, are tried on all sections. Particularly intensive work is done with sections in applying these low cost methods where the sections' costs have been running high. In case first-class work is not done on low cost sections, the foremen are shown how to improve their work.

Two results are obtained by the above handling: Costs are reduced and methods are improved. In short, general efficiency is increased. It has been our experience that this intensive work under engineering supervision has resulted in lowering, not only the cost of tie installation, which has been followed up especially, but it has also brought about a general reduction in costs. This report system was fully described in an article by Carl P. Hoff, which appeared on page 345 of *Railway Engineering and Maintenance* for September, 1925.

In the methods used for obtaining practical results by these field tests, described by the writer in *Railway Engineering and Maintenance* for November, 1925, it was shown that for the first half of 1924. before the improved methods were put into effect, the average cost of tie insertions in chatts or gravel on the Eastern division amounted to 35.5 cents per tie. This cost was reduced month by month until the average cost for the last half of 1924 was 29.8 cents per tie, a saving of 5.7 cents per tie. For the first half of 1924 the Eastern division costs were 0.7 cents higher than the average for the Frisco System, due chiefly to the fact that the Eastern division has several large terminals to maintain. However, in spite of this handicap, costs on this division for the last half of the year dropped to 4.3 cents lower than the system average.

During July, August and September full day tests were made on 23 sections and 1112 ties were inserted in chatts or gravel at an average cost of 24.1 cents per tie, indicating that still further reductions could be expected. These field tests were conducted until they had been made on practically all main line sections and several branch line sections, making a total of 60 tests. Ties were inserted under engineering supervision for at least half a day in each case and in the great majority of cases the supervision was extended over a full day.

Seven of the tests were conducted in terminals where wage rates are three cents per hour higher than outside and ties are inserted under rather difficult conditions. At no time were locations for making tests picked in any way and in the majority of cases the foremen did not know in advance that a test would be made. Favorable and unfavorable conditions were, of course, encountered. The different kinds of ballast naturally enter into the matter. The 60 tests were made in the following types of ballast:

	Number of Ties	Average Cost
22 in chatts	1108	$0.230
21 in gravel	835	0.264
5 in creek rock (over-size waste from gravel plants)	163	0.327
5 in lead slag	66	0.377
2 in cinders	84	0.253
8 in mixed ballast	398	0.288

Most of the mixed ballast was found in terminals where chatt, rock cinders and dirt had cemented into a conglomerate mass. In the cost of 26 cents per tie shown above with a total of 2,654 ties inserted during the test, the charges covering supervision by foremen and assistant foremen are included.

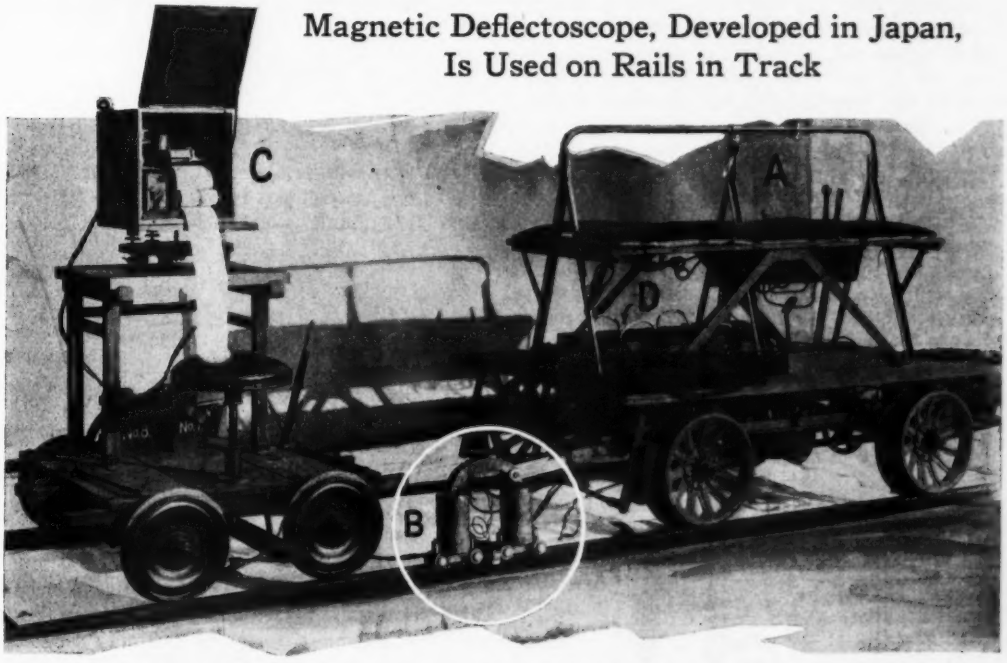
During the first half of 1924, as stated above, the average cost of inserting ties was 35.5 cents per tie but by the end of the year the average had dropped to 32.1 cents per tie for the entire year. For the year 1925 the average cost per tie for all classes of ballast dropped to 29.5 cents. Since 211,300 ties were inserted, this represented a saving of $5,494 over 1924, or of $12,678 on the basis of the actual cost during the first half of 1924. In 1926 up to June 98,982 ties had been inserted at an average cost of 27.8 cents per tie or, in other words, a saving in five months of $7,622 as compared with the first half of 1924.

The most interesting thing about this entire study is the fact that not only have the tie costs dropped appreciably, as shown by the definite figures given above, but they are still dropping and, in addition other maintenance costs, where any amount of money is involved, such as spotting track, tightening bolts and various other matters, are also well below the system average on this particular division where the tests have been made. In other words, it appears evident that the intensive work done, particularly in connection with ties, has spread automatically to other work. There is no doubt that the foremen take a deep interest in the entire question and they are continually finding new ways and methods of doing their work which results in better work and lower costs. In other words, the general efficiency has been raised very decidedly.

That the same methods can be applied to all maintenance work, including the laying of rail out of face, the painting and repairing of buildings, the rebuilding of bridges, etc., is self-evident and no doubt in the next generation of railroading such cost systems and close checks on work will be the normal and usual way of handling tasks of this kind as it now is in manufacturing.

A Transverse Fissure Detector

Magnetic Deflectoscope, Developed in Japan, Is Used on Rails in Track



A Motor Car Draws the Detector Along the Track at a Slow But Uniform Speed

THE investigation of rails or other steel or iron members for internal defects by magnetic exploration with the aid of suitable electric apparatus has been the subject of experimentation for a considerable period of years, but earlier devices developed for this purpose were not of a practical character, the principal difficulty being that the testing process was too slow and that it could not be carried out on rails in track. A marked improvement in developments along this line which offers promise of practical application to rails in track has been made by the Japanese Government Railways. This device, the method of its use and the results obtained with it are described below, the information presented being taken from a paper by M. Suzuky, engineer, research office, Japanese Government Railways, which appeared in the Bulletin of the International Railway Congress for April, 1926, together with supplementary information on more recent improvements obtained from S. Goto, director of the Bureau of Maintenance and Improvements of the Japanese Department of Railways.

Method Is Based on Magnetic Properties of Iron and Steel

It is well known that when a ferro-magnetic substance such as iron or steel is placed in an intense magnetic field, it is at once magnetized by magnetic induction and becomes a strong magnet. The intensity of the magnetization varies much with the property of the substances concerned and also with the mechanical and heat treatment previously applied to them. For instance, the intensity of magnetization of carbon steel decreases as the carbon content increases. Again, it is a well-known fact that the intensity of magnetization, that is, the magnetic permeability, varies over a wide range with the effects of forging, heat treatment, etc.; in other words, the intensity of magnetization is greatly affected by internal stresses. In addition to heat treatment and mechanical stresses, impurities such as slag, flaws and cracks or fissures in the metal are known to have a great influence upon its permeability.

If the permeability is constant, the magnetism caused by the constant magnetic lines of force (or magnetic flux) will be constant through the whole length of the test piece concerned, but if the test piece has a fault anywhere and the permeability is not constant, the constant intensity of magnetism will be broken at this faulty portion, i. e., where the leakage of the magnetic line of force will occur. So, if an exploring coil is slid along the length of the specimen and the induced current then produced in the coil is measured by means of a galvanometer, the leakage of magnetic lines of force will be determined. In other words, if the steel in a rail is homogeneous, its permeability is constant through the whole length of the rail and the leakage magnetic flux is constant. Therefore no induced current will be produced in the exploring coil and the galvanometer will not be deflected. On the other hand, if there is a fault anywhere in the specimen and the uniformity of leakage magnetic flux is broken locally, the induced current produced in the exploring coil will cause a deflection of the galvanometer. Consequently by moving the coil along the whole length of the specimen any internal defects in the rail will be detected.

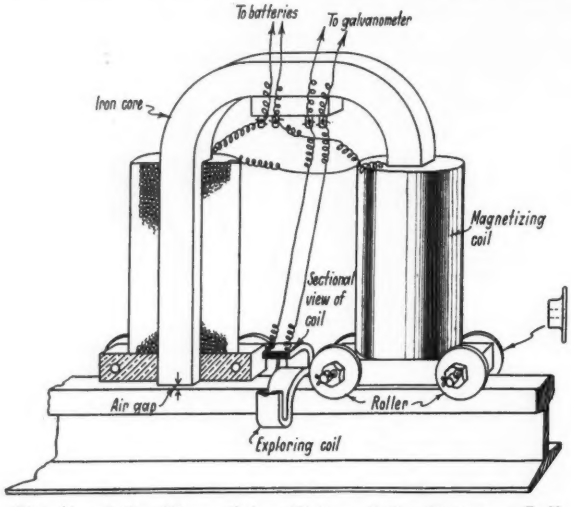
How the Principles Are Applied to Rail Testing

To magnetize a rail, an electro-magnet of the horseshoe type is placed on the rail and slid from one end to the other. The slightest variation in the air gap between the rail surface and two poles of the electromagnet gives so great an effect upon the magnetization of the rail that scrupulous care must be taken to maintain a uniform air gap. This is provided for by fitting the magnet with four small rollers on which it may be rolled along the rail.

The exploring coil, by means of which variations in

the induced current are detected, is mounted between the two poles of the magnet so that it slides along the rail with the magnet. It consists of very fine copper wire wound with silk and completely insulated with mica plates to provide against any leakage of external current affecting the coil. Lead wires extend from both ends of the coil to the terminals of the galvanometer. On account of the form of this coil it is not affected by magnetic lines of force (magnetic flux) passing through the rail, but only by leakage magnetic flux in the air surrounding the rail.

For examining rail in track the apparatus is fitted to the rail, so that a part of the rail will always be magnetized by an electric current flowing through the magnet. The apparatus is slid along the rail at a uniform speed by means of an electric motor car. If there is any crack, cavity or blow-hole, abnormal stress or other defect in the rail such as will affect the magnetism



Details of the Magnetizing Unit and the Detector Coil

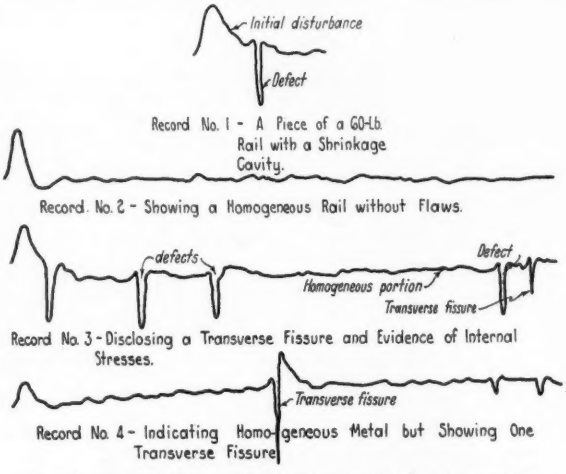
or permeability, the variation in the induced current will be recorded by the galvanometer as a moving beam of light on a ground glass. An operator following the movement of this beam of light with a pointer causes a pen to record the movement on a recording tape. This, of course, amounts to hand-copying of the electric record and seems like a rather crude process, but it was adopted in place of a photographic record of the beam of light as being more practical in the field.

The manner of using this device in track is shown in the photograph. Two small cars are provided. The electric motor car "A" with its storage battery "D" is used to pull the electro-magnet along the track while the recording car "C" stands still. The length of the run between changes of position on the recording car is determined by the length of the wire provided for a connection between the magnet and galvanometer on the recording car.

What the Records Show

Typical records made with the instrument are shown in the charts. Record No. 1 is of a short section of a rail which had been in track for several years. Chemical analysis of this rail disclosed segregation, but the deflection in the record was found to be the result of a shrinkage cavity.

Record No. 2 is of a new rail that had not been subjected to straightening. Microscopic examination showed a highly uniform distribution of carbon, manganese and other impurities. The record is free of any indication of defects. Record No. 3 shows a number of sharp variations, some of which are believed to be the result of internal stresses due to bending in the straightening press. In addition, the sharp drop in the line at the right was found to be the indication



Specimen Rail Records Obtained with the Apparatus

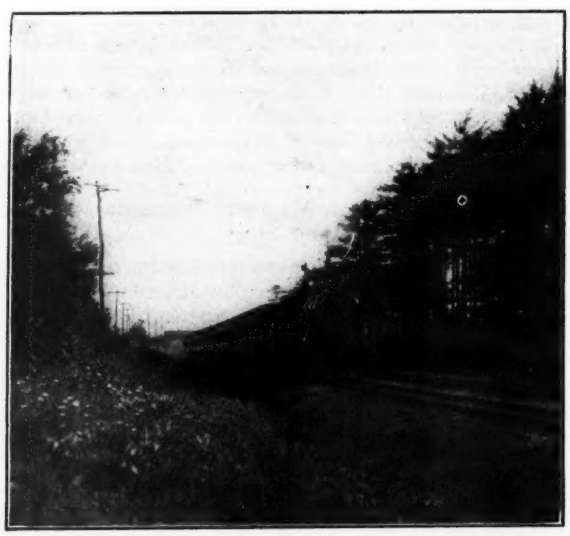
of a well defined transverse fissure. Record No. 4 also shows the location of a transverse fissure.

Summary

Careful analysis and check testing by other means have shown that defects actually existed in the rails at the locations indicated by the recording apparatus. These tests showed that the defects recorded in this way fall under the following heads: (1) Internal fissures, (2) Segregation, (3) Abnormal internal stresses such as are caused by the straightening press.

The record produced by the first class of defects is much sharper than those recorded for the other two classes of defects and they are readily distinguished.

Among the advantages claimed for the device are: Simplicity, accuracy, convenience, portability and speed of operation—from 0.4 to 0.8 of a mile of rails can be tested in an hour.



There Is No Real Substitute for Through Passenger Railroad Service

Building up the Morale of the Force*

A Leader Must Know His Job Thoroughly from One End to the Other

He Must Take an Interest in the Men Themselves that is Absolutely Sincere

By J. S. HYATT
General Manager, Chicago North Shore & Milwaukee

IN ORDER to study any problem intelligently and efficiently, it is first necessary to understand it thoroughly. So in discussing this problem of building morale, we must first look at it in its general aspect, and then consider it as the specific problem of a roadmaster and how it should be met.

Morale is defined as "a state of mind with reference to confidence, courage, zeal and the like, especially of a number of persons associated in some enterprise, as troops." If anyone doubts the importance of this problem in connection with maintenance of way work, I call his attention to the fact that 75 to 80 per cent of his expenditures are for labor, and that as the building of morale very largely affects the production of labor, it is easy for him to see that morale is of great importance. On the other hand, the fact should not be lost sight of that, from the employee's point of view, his wages are only one part of his compensation. No real red-blooded man works for wages alone. If he is a real workman, he will show an interest in his work, pride in his work, and a zeal and desire to produce efficiently and well. I think every roadmaster realizes the value of competition between working men and has used it time and time again in increasing the production of his gangs.

The Prerequisites for Building Morale

What are the prerequisites for building morale, not only in our line of work but in every line of work? One of the first requirements is capable leadership. No one can expect confidence, courage and zeal from a body of men unless their leader shows the proper qualifications. What are these qualifications? First, he must have ability; he must know the job. One cannot expect to be a leader of men without knowing the undertakings through which he expects to lead them.

He must have the ability and show the ability to perform the task himself properly and to know the requirements of a task, and to know when these requirements have been met. Second, he must show interest. He must be familiar with the job; he must work the job; he must know the job from one end to the other and show by his acts that he is familiar with the job, and he must show the same interest and enthusiasm in the job that he would inspire in his men. In just the same proportion that he shows this interest and enthusiasm he may expect to find interest and enthusiasm in the men he directs. But, above all other requirements, a capable leader must have that of human interest—interest in the men, the proper recognition of the brotherhood of men, the desire to help men in their jobs—in their life—in every interest which they have, and absolute sincerity in this interest and desire. There is no single factor which will break down the barrier between men, and particularly between men of different positions in life, like that of the human interest. If this is properly shown—that is, an absolute sincerity in this interest—I believe that it will break down all the barriers of prejudice and ignorance, and is, perhaps, one of the greatest single factors of capable leadership.

The second requirement of building morale is efficient organization. The best of leadership can never reach a body of men without efficient organization. It is impossible for even the greatest leader to get to all the men whom he would lead a realization of his ability, of his interest in their work, and of his interest in the men themselves, unless he first organizes that body of men efficiently so that representative men may stand in his stead and may carry his ideas, wishes and desires to the rank and file. Confidence, courage and zeal can only be inspired when it is known that such an efficient organization has been perfected, that the desires of the leader will be made known to the men and will be carried out by his lieutenants.

A sense of comradeship and a confidence that each man will do his share is always inspired by an efficient organization, and this very organization leads up to and produces the third requisite in building morale, namely, a loyal body of employees. Loyalty is the proper reaction to good leadership. It is the thing that builds good leadership, and as in the law of motion, reaction always equals action, just so in any efficient organization, leadership and loyalty react upon each other.

Morale in the Maintenance of Way Department

Perhaps some of you think that building morale among maintenance of way forces is a problem of the management. It is true they have something to do with it, but I feel that it is essentially a problem of each roadmaster. He must know his job; he must be familiar with the work that is going on and show an interest in the work, but above all he must know men; must show human interest in all of their undertakings.

*Abstracted from a paper presented before the Roadmaster's Convention at Chicago on September 22, 1926.

Proper human interest on the part of a roadmaster will result, first, in seeing that his men are properly paid. It is almost elementary that any plan for the improvement of the human equation, to promote better co-operation and more intelligent service, must be based upon adequate financial compensation. It is useless to talk about co-operation with men who are deprived of the necessities and comforts of life.

But I know what the roadmasters here are thinking. You would be glad to give your men more money, but that is not your problem; that is a function of the management and you can only do what you are told to do. I do not agree with you. I think this problem is your problem to be worked out by you in such a way that the management will have profited and the men will have profited. You, as a representative of the management, close to your men, should know better than anyone else what the proper compensation for your men is, and I repeat that unless your men are properly paid, it is futile to go farther. Proper payment does not always mean an increase in the payroll. Considerable funds are wasted annually by injudicious increase of payroll, and unless this problem is considered intelligently and coupled with proper working conditions, it will never be properly solved.

Look After Housing Conditions

Equally important with the pay check is the housing condition of your men. You can do much to improve the immediate situation of your men by care and prompt action in seeing that housing conditions are properly taken care of. This will do very much towards changing and improving the human relation between you and your men.

Another very important way to promote contentment on the part of maintenance of way forces is for you to see that they are properly tooled. A good workman does not like to work with poor tools and there is nothing that will make a poor workman any quicker than giving him poor tools. There is little opportunity for the labor agitator to work among the scattered forces in the way department, and I am ashamed to confess that I believe that this fact, together with the obscure position of these men, has often led the management to neglect these important factors that are fundamental in good relations. But while the situation is not one for the agitator to work in, yet it is a fertile field for other forces destructive of efficiency, and neglect of these fundamental conditions has led to an attitude of hopelessness and abandonment by our maintenance of way forces, which is very destructive to confidence, courage, zeal and proper efficiency. This situation cannot be corrected by any material improvement alone, although material improvement, where it can be made, must be the foundation. Human interest shown by the roadmaster through spending a large amount of time on the road, visiting with the men, knowing their life, taking an interest in their activities, their physical comforts, their opportunities for improvement materially, spiritually and intellectually, will go a long way toward correcting this condition.

What are the means by which this may be effected? What tools is the roadmaster to use? What method is he to employ in raising the morale of his men and in developing efficiency in his organization? A good organization will be one of the greatest factors to enable a program of this kind to be carried forward. The foreman stands in the place of a roadmaster. If the roadmaster shows the proper leadership towards his foremen, shows the proper ability in his work, takes the proper interest in the foremen's problems and shows human interest in all of his affairs, he will soon be able to multiply many-fold his own efforts, as each foreman will be a reflection of himself, carrying his thoughts and ideas to the men.

To show this leadership properly the roadmaster must organize his own office effectually; he must see that his foremen are fully informed about all activities of the railroad, that they know what to expect, what movements are to be made by other departments, so that they do not have to guess about things and are not anxious, but are confident that they know what to do and when to do it.

Be Careful in Writing Letters

Maintenance of way forces are scattered. It is impossible for a roadmaster to gather his men together in a compact group as the factory superintendent can, and the easy, natural way seems to be for him to depend upon letter writing. Of course, a great deal of this will have to be done, but the greatest care should be taken in letter writing. Most of our men and foremen are not well educated. They do not thoroughly understand the letter, and it requires the greatest ability to write a letter which will convey one's thought in a simple, clear, concise way, while it requires a great deal of tact to so word complaints and corrections as to make good the deficiency of the personal touch and the tone of a spoken word. Most men in our position do not have the qualifications for such letter writing, and if this qualification is to be supplied, it will be necessary for us to use the utmost care in the selection of clerical help.

But there are other means at hand for carrying on this informative work that are much more personal and more effective than letter writing, and while they may not be so easy and at first may seem impossible, yet they have been tried out and proven on many properties, and I believe, can be on all of them.

In the first place, great use can be made of a safety organization. The roadmaster, by connecting up his personality with the leaders of these organizations and by supervising, and, as far as possible, participating actively in these organizations, can do much towards getting to his men the proper information in reference to their work, and impressing his personality upon them.

I think every roadmaster should have a personnel assistant. This man should be a man of high character and good common sense, capable of dealing with the employees in his department, and capable of meeting them on a common ground without highbrow tactics and yet in no sense lowering his dignity. He should be a man of speaking ability, able to do educational work in a large sense. I would see that this man devoted his time largely to educational work among the foremen and employees. This educational work should not be confined entirely to those things which have to do directly with the job, or that directly affect the property, although they should cover the major part of the activities, but he should cover a broader field. Give to every man who desires to take the time and spend the energy an opportunity for self-improvement along all the phases of human endeavor.

Foremen's Clubs Have Proved Profitable

Foremen's clubs should be organized by such a personnel director, where a few foremen and the more intelligent men may get together and discuss their problems. He could foster garden clubs which would give the men a new field of endeavor, bring their minds out of a rut and enable them to see beauties in nature and in life that they never thought of before. He could

promote occasional athletic contests and carry on some social activities such as picnics, etc.

At first thought it would seem that, with groups of men so scattered as our men are on railroads, this would be impossible, but experience has shown that even when it is not possible to get large groups together, the small groups engaged in these activities reflect the spirit of the management, and produce enthusiasm and zeal and confidence that make better workmen and better men.

Company publications should be made newsy and full of items of interest to the employees—real human interest items, and reports of activities of small groups meeting together here and there over a division. You will probably say to me—"Oh, that is all very well, but how am I going to get the management to see the necessity of these things and then give them to me." I am not at all concerned about that. I know you men are resourceful and you get the things that you really think you need. If I could only make you see the advantage accruing from this kind of thing, I would be satisfied. In the days when you are employing foreign labor and using large gangs, you always are able to get all the interpreters you need. You have methods to procure for yourselves the help you need. Perhaps you thought you fooled the management and they didn't know what you were doing. Just try it once and go right honestly to the boss and tell him what you need. Get yourself thoroughly convinced and you will have no trouble convincing the boss.

Get Acquainted With the Employment Department

No obligation rests upon you in reference to your men until they are hired and become a part of the organization. Then your obligation begins. Here is an opportunity for every roadmaster to take advantage of the present organization and save himself a lot of trouble later. Every railroad has some means of employing men. The roadmaster should cultivate the acquaintance of this department, should know the employment manager and should impress upon him the type of men that he wants and needs, and should see that the employment manager reflects his ideals.

Rigid physical examination and careful employment methods are going to save a lot of future trouble, and the right kind of an employment department will go a long way in impressing the proper ideals upon the employees. Inasmuch as in the maintenance of way department a great deal of employment is done by the foremen directly, the roadmaster should give a great deal of thought and consideration to this subject. It is possible that this is one of the jobs that a personnel assistant could do very effectually for the roadmaster.

Foremen who work with each other can thus frequently place men with the road who otherwise would have to be passed on to some other employer. The employment department should keep the personnel record of every employee, and should act as a clearing house for transfer and promotion. The record of an employee should be complete and cover every phase of his activities with the company. The personnel, educational and employment work could well be centered in one department, so that it could become a service department for all other departments of the railroad.

Company Should Show Interest in the Men

Interest by the company in personnel matters should be fostered by the roadmaster. He should try to procure from his company free legal aid through company attorneys, medical attention through company physicians, and I believe that every company should have a small revolving fund from which it could loan small sums to employees who have become temporarily embarrassed. Companies that have tried this, protecting the funds by careful supervision and loaning only to employees who have shown the right attitude and received recommendation from their superiors, have never lost an appreciable amount of money and have been able to develop a great amount of good will that has been of inestimable value to the organization.

If organization and human interest are fostered along the lines that I have suggested, you will find your maintenance of way forces cemented into a great big family with the common tie of a common work, and we all know there is no tie so strong as the family tie; no loyalty so great as a family loyalty. The natural reacting of such a program will be a body of loyal employees who will go through the hard times as well as the good times, doing their best and always boosting for their employer.

Discussion

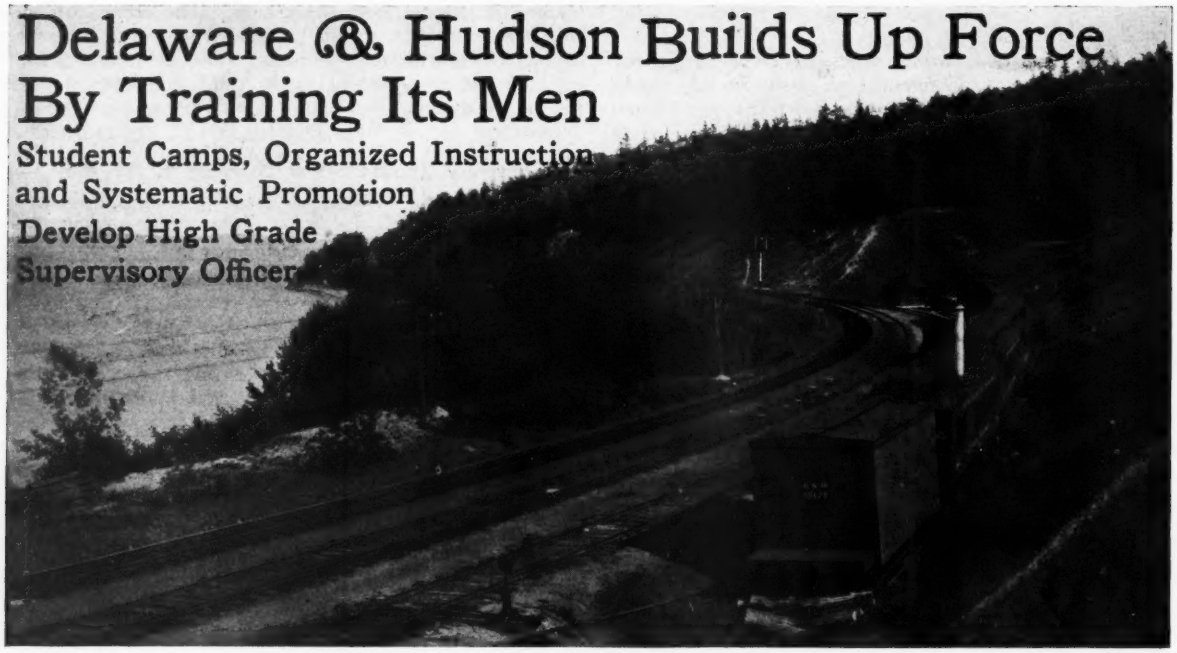
W. A. Davidson (U. P.), in commenting on one phase of Mr. Hyatt's paper, stated that the Union Pacific has organized what is known as the Family League, all members of which are assessed 10 cents each month for the purpose of accumulating a fund which is used to aid employees or the families of employees who suffer misfortune or meet with financial difficulties. H. Van Gorder (C. & N. W.) endorsed Mr. Hyatt's suggestion for a closer personal touch with the men. "Old-time hard-boiled railroading doesn't go these days," he said. "The officer who gets the best results now is the man who makes it a point to talk to all of his men whenever he has an opportunity and who shows a real interest in them and their affairs."

To illustrate this point, Mr. Hyatt told about an Austrian foreman on the North Shore who was left in an unfortunate predicament by the death of his wife. He had several children and was without friends or relatives to care for them, so the management arranged to have the children placed in an orphanage until such time as he could again provide a home for them. "You can rest assured," said Mr. Hyatt, "that the man appreciated what the road did for him. In fact, you cannot drive him off the right-of-way now."

Members and Families of the Big Four Track Foremen's Association

Delaware & Hudson Builds Up Force By Training Its Men

Student Camps, Organized Instruction and Systematic Promotion Develop High Grade Supervisory Officers



On the Delaware & Hudson Along the Shore of Lake Champlain

ONE OF THE increasingly important problems of the maintenance of way department is that of developing efficient supervisory officers to insure that in every stage of maintenance work the fullest return is realized on each item of expenditure. Recognizing this problem the Delaware & Hudson has taken steps to improve the character of its forces which, in recent years, has culminated in a definite system of education, training and promotion, afforded alike to all of its men showing initiative and supervisory capacity. This is carried out principally in the form of maintenance and safety meetings, group instruction on carrying out work, special classes on transportation rules, and summer camps for student engineers. Supplementing these methods of educating and training the men, safety certificates are given, section prize awards are made, a differential in the rate of pay has been effected and the record of every man is carefully watched with the view of rewarding service and ability with systematic promotion.

One of the most important features in the practices of the Delaware & Hudson, and one which has contributed largely to the success in the training of its men is the close supervision of employment which, except in cases of emergency, gives preference to men of good health and superior training. Once established in the service, every man from track laborer up is considered of supervisory capacity until proved otherwise and, with opportunities for self betterment within his grasp, all of his efforts are encouraged and carefully watched.

Special Effort Is Made to Develop Foremen

Recognizing that an efficient maintenance department must be built from the track laborer up, and further, that ability is not always the result of a technical education, young men of good health and character with as little as a common grade school education are encouraged to enter railroad service, and the more intelligent track men are encouraged to take a greater interest in their work with the view of bettering their condition.

In order to reward service, ability and merit among the men, a differential in the rate of pay has been established in the track forces, which provides for a standard hiring rate which is increased at the end of six months' service. The position of assistant foreman has been established as the first step in the promotion of the men and as a means of selecting the more capable men for special training in carrying out maintenance work, the handling of men, and also in the keeping of records and reports. Assistant foremen are not only given the opportunity to handle gangs in the absence of the foremen, but on special occasions are bunched into small gangs where, under the supervision of an experienced foreman or supervisor, they are instructed in the correct and most efficient method of accomplishing each detail of the work, and given an opportunity to handle the entire gang. From among these men the Delaware & Hudson selects its foremen as vacancies occur.

Foremen in Line for Promotion

With the development of an efficient group of assistant foremen the plane of the foreman on the Delaware & Hudson has been raised somewhat. All of these men were considered as being in the supervisory class and, as officers of higher rank, are given some special consideration, including specific vacations of two weeks each year with pay, and protection in case of illness. On the other hand, foremen are expected to put their entire services at the disposal of the railroad. They are paid on a monthly basis with no allowance for overtime on emergency work or in the regular performance of their duties which may require their being out after regular hours. When Sunday or holiday work, other than emergency work is necessary or desirable from the standpoint of the railroad, additional compensation is afforded the foremen in the form of a bonus. Compensation for prolonged service in connection with emergencies also takes this form and is paid upon the recommendation of the roadmaster or division engineer.

With the opportunity of becoming a track supervisor or a supervisor in the bridge and building department held open to the foremen, every effort is made to assist

them in the better performance of their work and to train them for larger responsibilities. While this assistance and training is given in many forms, probably the most effective is in the group meetings of foremen held from time to time under the direction of a roadmaster or supervisor, where track work and special problems are discussed and the men instructed in the most efficient manner of carrying out standard practices. At these meetings reports on actual work are often presented, accompanied by photographs, showing the men the work accomplished and the methods employed. Many of the photographs presented at these meetings illustrate actual violations of standard practices noted during the work, such as the use of shovels in removing and pulling in ties, the placing of jacks inside the rail when raising track, the piling of old ties near poles and under wires, etc. From all of these illustrations specific lessons are drawn and so impressed upon the men that such mistakes or violations of rules are not likely to occur in the future.

Hold Division Meetings One Day Each Month

One morning each month is given over on each division for meetings of the maintenance of way division safety committees, comprised of the division engineer, a member of the division engineer's engineering corps, a roadmaster, the bridge and building master, supervisors and some foremen, for the discussion of safety practices and the elimination of hazardous conditions, the afternoon of the same day being used for the discussion of the problems of the track and bridge and building departments. At this time lists of safety suggestions, bad practices noticed, and hazardous conditions observed are presented, which lists have been prepared by the foremen and submitted previously to the various division engineers. The result of this phase of the meetings not only discourages the use of hazardous practices but also encourages the observation of all such conditions and stimulates a live interest in the Delaware & Hudson's safety program. As a further stimulus in this regard, the foremen are awarded safety certificates for periods of six months, one year and two years in which no reportable accidents have occurred to themselves or to the men under their direct charge.

Another important step in the training of the foremen is the formation of classes by supervisors in which the men study certain specific transportation rules, rules governing the operation and maintenance of motor cars, and safety instructions, in all of which the foremen are required to qualify by examination. Instruction in the proper keeping of time and material books is also given the men by a traveling timekeeper who is employed under the supervision of the accounting department of the road.

In order further to stimulate the interest of the foremen in their work and to promote rivalry among them in the maintenance of their sections, cash prizes aggregating $2,000 are awarded each year after an annual inspection held in October, to those foremen whose sections show the highest standards of maintenance and likewise to those whose sections show the greatest improvement of conditions over the previous year. These prizes, which range from $50 to $100, are awarded on both a system and division basis. The system prizes are four in number, a first and second prize for the best appearing and best maintained sections and a first and second prize for those sections showing the greatest physical improvement. In order to avoid the difficulties that would be encountered in trying to compare branch line and yard sections with main line sections, and at the same time to stimulate the maintenance effort on all of these classes of tracks, the division prizes have been made six in number, two each for the best main line, branch line and yard sections. In addition, one prize is given on each division to the foreman showing the greatest improvement in his section, so that the foreman who has a poor section and no chance for first prize will not be discouraged and will have something to work for.

Camps Give College Men Advance Training

In the case of engineers on the Delaware & Hudson, the training of the men reaches ahead of the stage of permanent employment and selects from technically trained men those who show the greatest ability and aptitude for railroad work. Extending beyond this point it continues the training of these men along widely diversified lines after they are taken into the service and holds open to them the assurance of an outlet for their ability and reward for their efforts.

In a specific effort to interest technically trained undergraduate college men in railroad work, and at the same

The Camp Cars of the Student Camp Are Maintained to a High Standard

time build up a trained organization from which to select men for engineering and supervisory positions, a summer work camp for undergraduate engineers was organized in 1922, known as the Delaware & Hudson Students Camp. This camp is made up of from 30 to 40 men selected from the applications received, and is conducted under the direction of an assistant engineer who is a competent instructor in both practical railroad surveying and track work. The camp extends from about the middle of June to the first of September and during this time is housed in a specially fitted, well kept camp car outfit. In addition to their lodging in these quarters, the men are paid a small salary, out of which a charge is made for their meals.

Under the direction of the engineer in charge and experienced foremen, the men in the camp are divided into groups and are assigned to regular track work, extra gang work, and to special location and relocation survey work, the camp being moved about as the nature and location of the work may require. In this manner the men in the camp accomplish a large amount of work during the summer months and become acquainted with the pleasant and otherwise practical side of railroading which is a valuable supplement to their theoretical training. The value of the camp to the railroad is not alone in the amount of work accomplished by the men at small cost, but also and to a larger extent in that it builds up an organization of trained men from which it can select those who are the most industrious and proficient, and who show the greatest liking for the work.

When vacancies occur or when additional men are needed in the engineering department, the men trained in this camp and with the highest qualifications are given preference, which has resulted in the formation of a highly efficient engineering force upon which there is an increasing demand for men to fill supervisory positions in the maintenance of way and other departments.

Prospective Supervisors Are Given Special Training

Track supervisors and supervisors of bridges and buildings on the Delaware & Hudson are secured from the ranks of foremen, maintenance of way clerks and engineers, those men showing the greatest capabilities being put first in the line of promotion. Under this system most of the supervisors have come from the engineering department. In training men for this position, regardless of the department from which they have come, they are first put under the direct supervision of an experienced roadmaster and assigned to such special work as work train service, laying rail, raising track, ballasting, frog and switch work, etc., where each man is given an opportunity to become thoroughly acquainted with the details of every operation. As their experience broadens and the men become more proficient in their work, they are promoted to supervisors and assigned to certain sections of a roadmaster's territory with full charge of the work. Subsequently, as opportunity affords, the men are shifted to sections on the heavy traffic lines where the duties are more severe, or, in some instances are transferred to the bridge and building department. Supplementing the practical training of these men for the position of supervisor, they are also given complete instruction in all transportation rules and methods on which they are required to qualify before a regular rules examiner. This training not only qualifies the men to handle work trains, snow plows, locomotive cranes and other equipment operating on the main line tracks, but also is valuable training from a safety standpoint and in giving the men an insight into the operating methods of the road which leads to closer co-operation between the various departments. During the period of special training leading to the position of supervisor, no specific rates of pay are in force, it being the policy to increase a man's salary at the beginning of the period of training and then subsequently as his training is extended and as he is advanced to the places left vacant by the promotion of other men to supervisors.

Following service as a supervisor, the next promotion is to roadmaster with supervision over several supervisors, and then to some place in the office of the engineer maintenance of way, or a transfer to another department. Beyond this point of training, advancement of the men is largely a matter of personal effort and efficiency which may lead to the position of division engineer or division superintendent and put them in line of still higher positions.

Student Engineers Obtain Experience in Both Surveying and Practical Track Work

Through this system of training and advancement, every man in the engineering and maintenance of way departments of the Delaware & Hudson has an opportunity to secure a valuable and broad experience in railroad work with the assurance that with proficiency his efforts will be rewarded with regular and rapid advancement.

Programming the Work

Another policy on this road which has a large effect upon the efficiency and the class of men in its maintenance department is that of so programming its work and distributing it over the entire year that it is possible to maintain the organization practically intact. By following this policy the road not only secures the full benefit of the experience and training given its men but also encourages a better class of men to enter the service and precludes the difficulty often encountered where the organization is broken up in the fall and made up in the spring.

While concerted effort on the part of the Delaware & Hudson in the policy of training and holding its men has been in effect only for the past four or five years, marked results have already been accomplished. These are readily apparent in the better classes of labor employed, the increased efficiency and improved morale of the track and engineering forces, an improved standard of supervision, better safety records, and the decreased labor turnover occurring throughout the year. The more practical results of the Delaware & Hudson's policy are evidenced through the better maintenance of

its property and the increased amount of work which is being accomplished, with less manual labor, in fewer man hours. The success of the practices employed has depended to a large extent on the co-operation of the officers of the maintenance of way department under H. S. Clarke, engineer maintenance of way, who to a large extent initiated the practices in vogue and who has taken a keen interest in carrying them out.

Canadian Pacific Protects Slopes by Planting Willows

THE METHOD of protecting embankments from sliding or erosion by the planting of willows or other fast growing trees is not new but difficulty is often experienced in maintaining the young plants or shoots on the slopes until they can take root, especially when the fill is composed of material deficient in moisture. In some work of this nature carried on by the Canadian Pacific near Goderich, Ont., a method devised by A. S. Scheifele, Conestoga, Ont., was adopted and the results, after two years of service, have proved satisfactory. The method consists of placing the trunks or poles of willow trees in trenches extending up the slope of the embankment and then covering them to a depth of about a foot with earth, the butts of the poles being located near the foot of the fill. This method of planting insures that the trees will have the benefit of any moisture that may be present in the material of the embankment and take root for their entire length on the underside, while sturdy shoots are sent up on the upper side.

The work done by the Canadian Pacific contemplated the protection of the slope of an embankment just east of its bridge across Maitland river, the slope of a cut west of the same bridge and protection against erosion

One Year's Growth Above Timber Retaining Wall

of the river bank which threatened to extend to the abutment of the bridge. The embankment east of the bridge is on a side hill, with a height from ordinary water level to the base of rail of 64 ft. The material is clay, excavated from a cut immediately east of the embankment and considerable trouble had been experienced with erosion of this bank, due to the seepage of water through the fill from the hill on the opposite side of the track, as well as to the action of the wind and rain on the unprotected surface. Stone retaining walls and a section of pile and timber retaining wall had been built along the foot of the slope in an effort to stop the slides and piling had been driven along the shoulder of the fill to hold the track and ballast, while the bank was widened with cinders to replace the material lost by slides which occurred at intervals. All of these measures entailed considerable expense without affording permanent relief.

In the spring of 1924, a contract was awarded to Mr. Scheifele for the planting of 6,000 lin. ft. of live white willow poles, from 30 to 40 ft. long and with butt diameters of approximately 10 in., at the points before mentioned. The poles were buried at intervals of about 6 ft. along the embankment, the lower ends being placed about 10 ft. above the timber retaining wall, and about 15 ft. above the ordinary water level of the river where the stone wall is located. The material of the embankment above the timber retaining wall is wet, due to springs, while that above the stone wall

Two Years' Growth on River Flats

is of heavy blue clay, with little moisture and with a slope of about 1 to 1. On the river flats the poles were buried in trenches at right angles to the line of the river bank.

The poles began to sprout within a short time after they were buried and in the fall the shoots had attained a height of about 6 ft., while the roots showed an average growth of about 2 ft., and some of them were 5 ft. long. Another examination a year later showed some of the roots to be 7 ft. long, with an additional growth of 2 ft. on the branches, the greater development of the roots apparently have a retarding effect on the growth of the shoots. As was expected the growth in the dry clay soil was not as rapid as where the material was moist but was enough to protect the bank and to show that the growth would continue. A further examination in August of the present year found the willows growing rapidly. There have been no slides since the willows were planted and no further expense has been incurred in maintaining the embankment at this point. The installation of this protection was carried on under the supervision of J. A. Ervine, division engineer of the Canadian Pacific, London, Ont.

LAND RESERVATION REVOKED.—The reservation of a tract of public land along the right-of-way of the Alaskan Railroad was revoked by an executive order issued on November 17, on the recommendation of the Secretary of the Interior. The tract includes a strip five miles wide on each side of the railroad extending from Seward, Alaska, to the Knik river and was set apart for the purpose of supplying the road with timber. The manager of the Alaskan Railroad, in commenting on this matter, stated that there is very little timber within the area suitable for railroad purposes.

Nine Requisites for a Foreman*

By B. S. Arrington
Section Foreman, Oregon Short Line

EVERY man promoted to a foreman's position should desire to be efficient. Unless a railroad has good foremen, it is not only impossible to maintain track to the established standard, but it is also impossible to maintain it so that trains can be operated safely and efficiently over it at all times. Obviously the amount of work that is obtained from the track forces and the quality of this work is proportionate to the efficiency of the foremen in charge of these forces.

What makes an efficient track foreman? Let us analyze the qualities of a good track foreman and see what they consist of.

First: The good foreman has a sound knowledge of track work. It goes without discussion that a foreman must know the ways and means of maintaining track before he is promoted to a foremanship, but the good foreman does not stand still after he is promoted. He keeps on studying and never misses an opportunity to observe the methods employed on lines other than his own. He also keeps thoroughly posted on all instructions issued for his guidance. He reads books and magazines that pertain to his work, as much information can be gathered from these sources that is of unmeasured value to him in his daily duties.

Second: The good foreman has the ability to handle men. His force is often small, but even if it consists at times of only three or four men, these men must be handled right to get the most and best work out of them. If the foreman does not have the ability to handle his men properly, there will be lost motion, poor work and less work done. Nearly every man who is promoted to a foreman's place, has the necessary ability to handle men. Nevertheless, the good foreman checks up on himself occasionally to see if he is handling his force in the best manner and is getting the highest efficiency possible from his men.

Third: The good foreman is enthusiastic about his work. Proper interest is vital to success in any line, hence every foreman should possess a genuine enthusiasm for his work. He is the "general manager" of his stretch of railroad and the deeper the interest he takes in it, the better the results he will obtain. The good foreman is not officious but he is enthusiastic enough to show his superiors that he is looking after the property that is entrusted to him to the best of his ability.

Fourth: The good foreman, being a good leader, takes a personal interest in his men and does everything he can for their welfare. If there is any dissatisfaction among his men, he finds out what is causing it and, if within his power, he removes the cause. He realizes that it is in his power to make his men satisfied or dissatisfied and he knows that discontented men never do the best work.

Fifth: The good foreman uses judgment and foresight in planning his work. He always has his work mapped out ahead so that there will be no time lost in looking for something to do. Of course, the trackman's work never ends, but often the poor or careless foreman will be at a loss to know just where to put his men to work at odd times and many good hours are practically lost in this way. The good foreman, because of the fact that he "budgets" his work, always knows where to put his men to the best advantage, even for a spare half hour.

Sixth: The good foreman uses diligence in carrying out his plans. Diligence must be applied in carrying out all track work planned, otherwise the value of the planning is lost.

Seventh: The good foreman exercises judgment in giving precedence to work that is to be done. He knows that some work cannot be put off and he does that work without waiting; he knows that some work can wait until some more urgent work is done and he lays his plans to suit the conditions. Sometimes a job is done that has to be done over again because something was neglected before doing it. A stretch of track is surfaced and lined before it is drained. It was the intention of the foreman to drain it the next day, or the day after that. The foreman's intentions were good, but something prevented it and as the days go by the track is soon in need of surfacing and lining again, due to bad drainage.

Eighth: The good foreman uses the materials put at his disposal so as to get the greatest amount of good from them. He sees that every rail, spike and bolt, every tie and piece of ballast and every drain box or piece of tile is used to produce the greatest amount of good.

Ninth: The good foreman is loyal to his company. If a foreman is not loyal to the company that employs him and to the officers to whom he reports, he cannot be a good foreman. If he is not loyal, he cannot expect the men under him to be loyal, either to the company or to him.

If a foreman possesses the nine qualities mentioned, he is without doubt an efficient foreman.

*From a paper read before a recent meeting of the Division Council of the Maintenance of Way Foremen's Association of the Union Pacific System at Montpelier, Idaho.

Pennsylvania Awards Track Prizes

ACCORDING to the recent announcement of the award of the annual track prizes for supervisors and assistant supervisors on the main line divisions of the Eastern region of the Pennsylvania, the principal, or "Klondike" prize, which is given for maintaining the best line and surface between New York and Altoona, Pa., and Philadelphia, Pa., and Washington, D. C., was awarded to A. E. Preble, supervisor, and Wesley deValinger, assistant supervisor, on Division No. 33 of the Philadelphia division at Middletown, Pa. This prize amounts to $1,200, of which the supervisor receives $800 and the assistant supervisor $400.

The prize for the greatest improvement in line and surface between the same points made during the year, amounting to $1,000, was awarded to R. J. Smith, supervisor, and William Chauvenet, assistant supervisor, on Division No. 31 of the Philadelphia division at Downingtown, Pa. The supervisor's share of this prize is $700 and the assistant's $300.

Three additional prizes of $800 each were awarded to the supervisors and assistants maintaining the best line and surface on the three general divisions comprising the main line between New York and Altoona and between Philadelphia and Washington, excluding the winners of the "Klondike" prize. These prizes, which include $600 for the supervisor and $200 for the assistant supervisor, were awarded as follows: H. D. Stowe, supervisor, and E. F. Shelley, assistant supervisor, on the Middle division at Ty-

rone, Pa.; C. O. Long, supervisor, and L. M. Leedom, assistant supervisor, on the New York division at Trenton, N. J.; and R. G. Ford, supervisor, and S. R. Hursh, assistant supervisor, on the Maryland division at Newark, Del.

Reports on Recent Accidents

AMONG recent accidents reports issued by the Bureau of Safety of the Interstate Commerce Commission were two in which maintenance of way forces were directly concerned. While entirely different in character, each teaches a definite lesson and for this reason has been reviewed briefly below.

Spike on Rail Derails Train

On October 15, 1926, the locomotive of a passenger train on the Southern was derailed on a turnout curve of 3 deg. 15 min. near Williamstown, Ky., as it was about to leave a passing track and enter the main track. The engine was over-turned and the fireman was killed. It is estimated that the speed of the train at the time of the accident was from 10 to 15 mi. per hour.

Following the accident the engineman stated that he had noticed a slight jar of the engine just before it was derailed, and upon an examination of the track an indentation was found on the top of the outside rail followed by a wheel flange mark extending along the rail for a distance of 8 ft. 8 in. to the point where the wheel dropped to the tie. A number of track spikes were found lying on the ground at this point and one of them, which had the appearance of having been run over, was found to match exactly the indentation found on the head of the rail.

Further investigation developed that this passing track had been used by the track supervisor and an extra gang foreman with a gang of 16 laborers to move a push car which was being loaded with switch material. The conclusion of the report of the Bureau of Safety of the Interstate Commerce Commission is that the accident was due to the presence of a spike on the running surface of the rail but stated that it had been impossible to determine under just what circumstances the spike happened to be there.

Train Hits Motor Car at Railroad Crossing

Four New York Central bridge carpenters were killed at Gibson, Ind., when the motor car in which they were riding was struck by a Michigan Central passenger train at a railroad crossing. The following statement of the circumstances of this accident was taken from the report of the Bureau of Safety of the Interstate Commerce Commission.

A gasoline motor car on the New York Central carrying six men of a carpenter force travelled south toward the crossing on the southbound track to a point where the track was occupied by a freight train which had been stopped at the interlocking plant for the crossing. The carpenters then picked their car up and put it over on the northbound track and proceeded against the current of traffic alongside the freight train until they reached the derail which is located 512 ft. north of the crossing. At this point it would have been possible for members of the crew to have seen the Michigan Central train approaching from the left but apparently no notice was given of this for the car proceeded at once to the crossing at a speed of about 12 mi. per hour where it was struck by the Michigan Central passing train travelling at a speed of about 40 mi. per hour. The view of the Michigan Central train approaching from the left was slightly broken by small buildings, a tool house and two hand car houses, but with these exceptions a clear view can be had of the Michigan Central tracks for a distance of one-half mile east of the crossing. For this reason it was concluded that the accident resulted entirely from the failure of members of the motor car crew to keep a proper lookout.

Southern Pacific Uses an Air Device for Cleaning Switches

THE importance of keeping dirt and other matter from between the switch points and the main rail is universally understood and the standard railroad rules require that a trainman throwing a switch must examine the points to see that they are closed properly before leaving them or allowing a train to pass over them. Where switches are thrown from a tower and the layout includes movable point and spring frogs in addition to the switch points, careful attention is needed to prevent the accumulation of grease and dirt which would interfere with the proper movement of the different parts.

Where electro-pneumatic plants have been installed for throwing switches the Southern Pacific has devised a cleaning tool made from a piece of ½-in. pipe, from four to six feet long. A flat extension is fastened firmly to one end of the pipe for use as a scraper into which a ⅛-in. nozzle is also fitted. A section of rubber hose of the desired length, usually 25 or 30 ft., is attached to the other end of the pipe to allow connection with the air line which operates the switches, a valve being introduced in the pipe near the hose connection so that the air can be turned on or off at the will of the operator. The accumulated grease and grit is loosened by the scraper and then blown off by the compressed air through the nozzle, the air pressure of 70 to 80 lb. available at the interlocking plants being sufficient to remove any loose sand, gravel or cinders or the grease and grit which has been loosened by the scraper, much more quickly than is possible by the ordinary method of using a broom.

Air Device for Cleaning Switches

What's the Answer?

What Our Readers Have to Say on Current Questions That Perplex Those Engaged in Maintaining Tracks, Structures and Water Supply Facilities

QUESTIONS TO BE ANSWERED IN THE FEBRUARY ISSUE

1. *What are the practical winter uses of pneumatic or electric tie tamper units, aside from tamping ballast?*

2. *Is it economical to install or renew pipe culverts during the winter season on roads in northern territory?*

3. *What is the best method of repairing a bituminous or plank highway crossing which has heaved badly, when such repair is advisable before the frost leaves the ground?*

4. *Is the use of booster pumps recommended for increasing the flow in long pipe lines of small diameter where friction losses reduce the capacity of the line below the requirements?*

5. *What causes the flame in a switch lamp to flicker and how can it be remedied?*

6. *For what purposes can cinder concrete be used with economy and safety?*

7. *What special precautions should be taken in the operation of motor cars in the winter from the standpoints of both safety and efficiency?*

8. *When cold weather requires the heating of concrete materials, is it advisable to guard against overheating as well as insufficient heating?*

Should Foremen Check The Quality of Ties?

To what extent should foremen be required to check the ties received by them to see that they comply with the standards for quality and grade?

The Foremen Should Make Full Report to the Road-Master as to the Quality of the Ties They Receive

By B. E. Haley

General Roadmaster, Atlantic Coast Line, Lakeland, Fla.

Until a few years ago, before the practice of treating ties became general, the ties on most roads in the south were purchased and inspected by the roadmasters. As the roadmaster had to use the ties he purchased he was very much interested in the quality and grade. Since practically all the roads are now treating the larger portion of their ties, the inspection has been taken over by the purchasing department which is not always as interested in the quality and grade of the ties as the roadmasters were when they made their own inspection.

It is my opinion that on many roads, the roadmasters and foremen have fallen into a habit of taking the ties sent them, without paying enough attention to their quality. It is also my opinion that all ties received by the foremen should be thoroughly checked as to quality and grade and a full report made to the roadmaster. In case the ties do not come up to specifications, he in turn can take the matter up with the management. I believe that this practice, followed regularly, would soon result in ties of the proper quality and grade being furnished. I think it is the desire of the management, that ties of the proper kind should be furnished, and if they do not hear any complaint from the men who use the ties, they naturally suppose that they are being furnished with ties suitable for their needs.

The Foreman Should Not Be Required to Make a Detailed Inspection

By J. D. Keiley

Supervisor, Chesapeake & Ohio, Russell, Ky.

The size, grades and quality of timber for use as cross ties should be set up by the management. They should determine the maximum defects in the quality of any tie, showing what will be accepted for use in yards, side tracks, main line, etc. Too high a standard of grade or quality can hardly be set, especially where the average tonnage is excessive and large locomotives are used. It is false economy to use small ties, even in yards where the above conditions exist.

Owing to the ever-growing scarcity of timber, and especially where good tie timber cannot be secured readily on the lines of a railroad, there is always a temptation to lower the standard of quality of ties in order to be able to purchase ties on their own lines. This lowering of the quality decreases the rejections and eliminates the consequent freight charges which would be incurred if the ties were purchased on foreign lines.

The rigid adherence to a high standard of quality of ties should be insisted upon by maintenance officers; that is, by the engineer maintenance of way, division engineers, assistant division engineers and supervisors. In their inspections over their lines it should be a simple matter to keep tab on the general quality of timber furnished.

The foreman should not be required to check the ties

received by him to see that they comply as to quality and grade. Tie inspectors should be used for this purpose. On most railroads at the present time the foreman has so many things to do and so many reports to make, that they should not be burdened with any other work. The foreman's work is to maintain the track to a given standard. The standard as to quality and grade of ties is established by the management and any check to be made should be made by competent inspectors. Foremen should not be turned into tie inspectors.

The foreman undoubtedly should know what the standard of quality of ties should be and upon receipt of a shipment not in accordance with the standard should notify his superior in the same way he would notify him of the receipt of defect rail, bad bolts or any other kind of defective material.

The engineering department, or maintenance of way department should establish the standards for ties, the purchasing department should purchase to that standard and the inspection department should see that the standard of quality is adhered to. The foreman, as the user of the material, should not be worried with checking the quality in any other way than his general observation of any material.

Aside from the foreman knowing what the standard of quality of ties for various uses are, he should only be required to report on ties in the same manner in which he would report defective material of any kind. It is, in my opinion, strictly up to the engineering department to see that the purchasing department purchases and delivers ties in accordance with their standard of quality.

The Foremen Should Inspect All the Ties They Receive

By F. W. Easton

Roadmaster, Southern Pacific, Ogden, Utah

All track foremen are furnished the size and grade or kind of ties used by the railroad, (if not they should be), and they should check all new ties received on their respective sections as to measurements, rot, split, warp, seasoned, or unseasoned, as their working rules require them to do. I do not think they can pass on the quality of the timber successfully.

When ties are handled by extra gangs, either for maintenance or new work, the number of ties handled makes it prohibitive for the foreman to give his personal attention, but assistance can and should be given him to inspect ties. A check by the foreman will pick up any oversight or neglect on the part of the regular inspector where ties are received.

Does Submergence Injure Fresh Concrete?

In depositing concrete in cofferdams where pumping must be done are there any objections to stopping the pumps at the end of the day's work and allowing the water to submerge the fresh concrete, the pumps being started by the night watchman in time to permit work to be resumed in the morning?

It Is Not Injurious and Is Economical

By F. E. Bernhardt

Bridge Engineer, Chicago & Eastern Illinois, Chicago

I believe that it is good practice to allow the water to rise in cofferdams during such time as concreting is not in progress, unless the water contains ingredients that are injurious to the concrete or in certain exceptional cases where the pressures may be so great as to make this practice undesirable. Where the work is carried on with a single shift, as is usually done in ordinary bridge work, the shutting down of the pumps during the greater part of the night is a distinct economy. Laitance sometimes forms on the surface of submerged concrete but this is easily removed with stiff brooms and a liberal flushing with water.

No Injury if Water Is Free from Alkali, Salinity or Sewage Pollution

By M. Hirschthal

Concrete Engineer, Delaware, Lackawanna & Western, Hoboken, N. J.

Where the water has no salinity and is free from alkali or sewage pollution I see no objection to permitting water upon the freshly deposited concrete until the following day when concreting is resumed. Where, however, the cofferdam work is in salt water or in water highly alkaline in character or polluted by sewage, there are strong objections to stopping the pumps because such water attacking the concrete before it has attained its final set, or is still green, will cause its rapid disintegration and make it valueless to carry the loads it is designed for.

On economical grounds I prefer to run the concrete continuously in three shifts so that the working of the pumps during the night will not be in vain, rather than have the night watchman start the pumps in time for the daily shifts. In other words, it would appear to me to be cheaper to do the concreting in three shifts rather than have the pumps working while there is no concreting.

Extra Rail for Emergency Use in Main Tracks

Is it necessary to provide an extra rail on rail rests on every mile or can this interval be increased, possibly to the extent of providing one or two rails on a rail rest at the tool house for the entire section?

Depends Largely on the Condition of the Rail in Tracks

By J. D. Keiley

Supervisor, Chesapeake & Ohio, Russell, Ky.

This depends altogether on the condition of the rail in the section and the number of tracks. On double or multiple tracks where tonnage is heavy there should be a rail at every mile post on rail rests. On single track, a rail on the rest at every other mile should be sufficient. Where the rail in the track is old and is in such condition that the rails are breaking up frequently there should be enough rails at the tool house to protect the rail rests. The rails at the rests should be No. 1 relay as by the time the rail has to be replaced the new rail has worn down and the No. 1 relay will fit better.

One Rail Should Be Provided for Each Mile of Single Track

By Lem Adams

Roadway Assistant, President's Office, Union Pacific, Omaha, Neb.

Rail rests two miles apart containing one rail for each mile of single track are about the economic minimum for adequate protection against rail failures in any main

line track. With rail rests so spaced it is not necessary to truck a repair rail a greater distance than one mile.

I have never been in favor of having repair rails at the tool house only, as with rails so located it often happens that when a foreman discovers a defective rail in track when returning to headquarters in the evening, he will simply put on a pair of joint bars for protection and figure on changing out that rail the next morning, rather than run to his tool house, load the rail on his push car and return to the point where the defective rail was discovered. However, if a repair rail is located conveniently, he will make the change immediately, providing, of course, that temperature conditions are such as will permit his doing so.

There Should Be One Extra Rail at Each Mile Post

By Alex Antymniuk

Section Foreman, Canadian National, Riverhurst, Sask.

It is advantageous to provide an emergency rail on a rail rest at every mile post, together with spare angle bars, bolts and spikes. If this is done a broken rail can be replaced quickly and will avoid delay to trains when the rail is so badly broken that it must be replaced before trains can proceed. If the emergency rails were kept at the tool house this would sometimes cause serious delays to traffic, especially during times of heavy snow. The rails on the rests should be given a coat of black oil as often as necessary to keep them from rusting.

It Depends on Various Factors

By E. P. Safford

Supervisor of Tracks, New York Central, Silver Creek, N. Y.

Emergency rails on sections are necessary for two reasons: To take care of replacements of broken or defective rails and to care for rail damage due to minor wrecks and derailments. The age, known history and condition of the rail on the section govern requirements of the first class. Damage to rail from major wrecks and derailments must be provided for from a general stock. There are many wrecks and derailments, however, where only the rail at one point is damaged. Such cases, if any rail damage occurs, usually require renewal of several rails and the rails to protect against such damage should be available within one mile. On this account there should be two rails of such pattern as is used in track, at each mile post. This number is also sufficient to protect emergency breakages or defective rails in rail recently laid for from one to three years. After this length of time such new emergency rails should be picked up and replaced with relayer or used rail, since new rails patched in for replacements with rail which has been in tracks several years soon batter and make bad joints.

Emergency rail provision where rail has been in track several years should be governed by a knowledge of the failures of that particular stretch of rail in the past. All rail on a division should be very thoroughly inspected in the fall and badly burned rail removed, also any rails found to be battered or defective. Each section should be then provided, at the tool house or other convenient point, with such a quantity of the particular patterns of rail on that section as experience has shown may be necessary to carry it through the winter season.

On multiple track divisions, many sections require several different sections of emergency rail. The fewer patterns of rail per track section the smaller number of emergency rail will be necessary. The general use of motor cars has simplified the emergency rail problem considerably by making practicable the movements of a few rails by track gangs for considerable distances.

The writer bases the above procedure on a four track division where main tracks are laid with 100 lb., 105 lb., 115 lb. and 127 lb. rails, some of it in service up to 15 years. The keynote of the whole problem is to provide protection with a minimum of investment in stock and a maximum of promptness in repairs and renewal. It should be borne in mind that such emergency renewals are as often made at night as in the day time, and on this account, the stock must be reasonably close at hand.

Operation of Pumps by Station Employees

Under what conditions is it advisable to place the operation of pump houses in the hands of agents or other station employees?

May Be Done Under Certain Limitations

By Inspector of Water Service

The practice of placing the operation of pumps in the hands of agents or other station employees is sometimes carried out with satisfactory results and in other cases the practice does not work at all well. Usually it should not be attempted unless the requirements are small and sufficient storage capacity is provided so that the chance of being without water will be minimized in case of trouble with the pump which the agent cannot remedy. The pump and motor should be simple and as near foolproof as possible since most agents or station employees are likely to have little mechanical experience.

Where this practice can be carried on satisfactorily it often results in marked economics and for this reason everything should be done by the water service department to train the men in the operation of the machinery and the making of emergency repairs. Concise typed instructions, supplemented by personal instructions by a representative of the water service department will do much towards making the practice a success.

Flashing for Built-Up Roofing

What is the best method of flashing for built-up roofing on brick buildings?

Flashing Shingles of Two Forms Are Suggested

By F. C. Baluss

Engineer of Bridges and Buildings, Duluth, Missabe & Northern, Duluth, Minn.

Use a flashing shingle of convenient size bent in the shape of "Z" to fit the pitch of the roof, shown in Fig. 1. The upper horizontal portion is inserted be-

Details of Roof Flashing

tween two courses of the brick work and laid in mortar, the vertical portion fits snugly to the brick while the lower horizontal part is nailed tightly to the roof boarding after one layer of the built-up roofing is placed,

as shown in Fig. 2. Additional shingles are then applied, proceeding up the roof, the lower portion of each shingle lapping over the upper one just laid. Other courses of the built-up roofing are then applied and the whole is covered with suitable roofing cement.

If the roof is flat and the joint parallel with the brick course a long piece of flashing is used and the joints are soldered after laying. In roofs of considerable pitch or where there is a probability of its sagging, two courses of flashing shingles are sometimes used. These are bent to form an "L" as shown in Fig. 3. The first is applied on the first layer of the roofing with the vertical leg tight against the brick. One leg of the other shingle is then inserted in a mortar joint of the brick work in such manner that the vertical leg will come down and cover the upright leg of the first shingle as shown in Fig. 4. This method allows some settlement of the roof without tearing the flashing away. Flashing shingles are cut to convenient sizes to use stock sheets without waste. Lead, copper and tin are the best materials for flashing in the order named.

The Length of Stringers for Open Deck Trestles

What are the relative advantages and disadvantages of stringers spanning two panels and those of single panel length for open deck trestles?

Stringers Spanning Two Panels Add to Longitudinal Stability

By G. G. Thomas

Engineer of Bridges, Atlantic Coast Line, Wilmington, N. C.

Wooden stringers spanning two panels in open deck trestles have the advantage of giving at least one stringer per chord continuous over two panels and therefore add to the longitudinal strength and stability of such a trestle. This type of construction also has the advantage of the additional resistance to bending obtained from the continuous or partially continuous action of such stringers in the chords.

Double Panel Lengths Provide Greater Strength

By L. L. Kelly

Bridge Engineer, Norfolk & Western, Roanoke, Va.

A stringer spanning two panels ties the structure together better, gives more strength for the same size of stringers on account of being continuous over one support and gives greater bearing area on the cap when only one panel is loaded. The only advantage I see in stringers spanning a single panel is they are cheaper and are easier to replace.

Single Panel Lengths Are Preferred

By G. A. Haggander

Bridge Engineer, Chicago, Burlington & Quincy, Chicago

The Chicago, Burlington & Quincy has always used single length stringers in its open deck pile trestle bridges. The standard trestle plan calls for a panel length of 14 ft. center to center of bents, with four 8 in. by 16 in. by 7 ft. timber packing blocks notched over the cap and fastened to the stringers by means of the chord bolts.

The main advantage of using single length stringers is the ease in handling during construction and in making repairs. An 8-in. by 16-in. stringer, 14 ft. long, weighs approximately 600 lb. and can be handled by a small number of men. In making repairs all of the work is concentrated in one panel of the bridge with no disturbance to the remainder of the structure. On the other hand a double length stringer weighs approximately 1,200 lb., requiring a larger number of men to handle it, while in making repairs two or three panels of the bridge must be disturbed.

The advantage of the single length stringer is entirely one of cost. The double length stringer has the advantages of keeping the track in better line, additional strength due to the continuous beam action and additional safety in case a supporting bent has settled or has been washed or burned out. The occasions on which the latter feature would have been an advantage have been so rare that I feel that the matter of economy in first cost and maintenance outweighs it.

The Longer Stringers Stiffen the Bents and Act as a Factor of Safety

By J. D. Keiley

Supervisor, Chesapeake & Ohio, Russell, Ky.

A stringer covering two bents stiffens the bents and holds them in line. While the stringers spanning two bents will not carry any greater load than those of one panel length, they provide a factor of safety in case of the failure of one of the caps.

Maintaining Line and Surface at Turnouts

What is the best method of maintaining line and surface at turnouts?

Good Material Carefully Maintained Is Necessary

By J. D. Keiley

Supervisor, Chesapeake & Ohio, Russell, Ky.

The rail should be No. 1, or new rail, with no chipped or battered joints. The angle bars should be in first class conditions, and the bolts should be kept tight. With surface bent, battered, chipped, or kinked rail in the turnout, it is impossible to maintain line and surface. This is equally true with worn angle bars and loose bolts.

The track must be in good gage, fully spiked, the running rails, guard rails and frog tie plated and gage rods should be used. (The use of gage rods depends on the traffic and tonnage.) The gage should be from ¼ in. to ½ in. wide at the switch points. The ties must be in first class condition and properly spaced.

The turnout should be surfaced on a bed of lime stone from 12 to 18 in. deep if the grade will permit. The roadbed must be in good condition and properly drained. The ties should be pick tamped on the head and shoulder, but not over 10 in. from the rail, the rest of the ballast being shovel tamped. If ties are pick tamped across there is a tendency to get center bound track. Pick tamping in the center of the ties does more harm than good. After getting a good surface and line, and the cribs filled, a heavy shoulder of ballast should be made.

Proper Installation Is Important

By C. E. Buhrer

Supervisor, New York Central Lines, Kenton, Ohio

In order to maintain good line and surface at turnouts it is necessary that the track the turnout leads from is put to true line before the turnout is installed and also that the turnout be spiked to true line when put in.

Very often bad line in turnouts can be traced to the installation. All switch ties should be plated, as well as all ties for at least a rail length ahead of the switch points and back of the heel of frog and on the turnout to the clearance point. The same quality of ballast should be used to the clearance point as is used through the switch, and the turnout to the clearance point should be put to the same grade as the track it leads from.

The squaring of the first joints ahead of the switch points and the use of the same length rails through the lead and on the track the turnout leads from permits breaking joints through the lead on both tracks and eliminates the bad practice of scattering or bunching joints. Sufficient anti-creepers to hold the rails in place through the lead as well as ahead of the points and back of the frog materially help to hold turnouts in line.

Protecting Ties from Damage Where Ashpans Are Dumped on the Track

What is the best method of protecting ties from fire where ashpans must be cleaned on tracks where no cinder pits are available?

Chestnut Ties Covered With Dirt Do Not Burn Readily

By F. J. Meyer

Assistant Engineer, New York, Ontario & Western, Middletown, N. Y.

We have found that chestnut ties do not burn as readily as pine ties and have made it the practice to use large chestnut ties in the tracks where the ashpans are cleaned. The ties are covered with about two inches of dirt and in shoveling the cinders from the track care is taken to remove as little of the dirt as possible. In the few places in the main track where ashpans are cleaned an effort is made to leave enough ashes between the rails to cover the ties in order to protect them from the hot cinders.

Old Flue Sheets or Steel Plates With a Layer of Sand Between Plates and Ties Are Effective

By J. D. Keiley

Supervisor, Chesapeake & Ohio, Russell, Ky.

The best method of protecting ties from fire where ashpans must be cleaned where no cinder pits are available is to spread about an inch of fine sand over the length of track on which the fire pans are to be cleaned and then set over this old flue sheets, or old pieces of steel car siding, which will fit exactly between the rails, and spike them to the ties. It will then be possible to shovel the ashes into wheel barrows and dispose of them.

Use Hard Wood Ties Covered With Sand

By John H. Dooling

Assistant Track Supervisor, Boston & Maine, Waltham, Mass.

On the portion of the track assigned for dumping ashpans non-resinous hard wood ties should be used, covered with coarse, heavy sand rolled firmly to a depth of three or four inches above the top of the tie. The cinders should be wet down thoroughly before they are dumped and should be removed from the track as promtly as possible after they have been dumped.

Costs Now and Then*

By J. M. Gibbs

Supervisor Bridges & Buildings, Missouri-Kansas-Texas, Parsons, Kan.

I WOULD like to say a few words in answer to two articles reecntly published relative to the cost of bridge work as compared with the cost of the same class of work 20 years ago. One of these articles appeared in *Railway Engineering and Maintenance*† and apparently endeavored to explain this by saying that we had made practically no improvement in our working methods—that the work was being performed in the same way and according to the same ideas as 20 years ago. I do not wish to dispute this, as it is in a measure true; we still frame our timber, cut off our piling, bore holes, tighten nuts, drive spikes and handle timber by hand, as we did 20 years ago. But on this road each division gang now has a hand-power crane or derrick, which is used for handling heavy creosoted stringers on bridge renewals. Due to the fact that we no longer have 12 to 15 men in a bridge gang—usually 10 men is the limit with 2 of them flagging—we can no longer handle 8 in. by 16 in. by 28 ft. treated stringers with 8 men to advantage; the old 7 in. by 15 in. by 28 ft. untreated stringers were considerably lighter, but they were a fairly good load for 10 men to handle quickly. Changing out stringers with a crane is a somewhat slower process, but is more economical, because fewer men are required.

This question of the increased cost of bridge maintenance as compared with that of 20 years ago, is more of a mental phantom than an actual reality.. For illustration: In May, 1905, I received a circular letter from the Denison office stating that, "Mr. W. D. Burke has just completed renewing a three-ply trestle at a cost of $1.30 per foot—why cannot all foremen do as well?" At that time I was on the Trinity branch on which trestle chords consisted of two 8 in. by 16 in. stringers, and $1.06 per foot for renewing a two-ply stringer was the maximum amount that could be shown for labor without an explanation. I was two months finding a satisfactory explanation for spending $1.10 per foot in renewing the deck of one bridge.

After all, the question of increased cost hinges on the amount of work performed for the money paid—and the carpenter who drew $2.20 for 10 hours' work 20 years ago, now draws $4.54 for 8 hours or 56¾ cents per hour. In order to obtain the amount of work today that we did 20 years ago, we have to pay him $5.67½ for 10 hours or 2.58 times the cost that 10 hours output of labor would have cost 20 years ago.

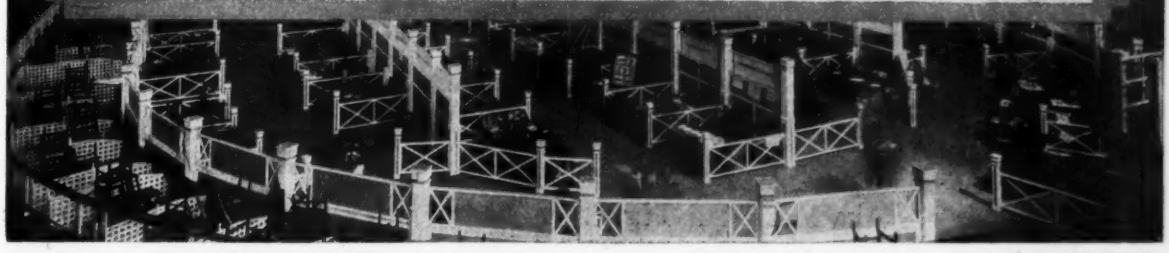
Renewing a deck with four-ply chords would have cost $1.60 per foot 20 years ago. It should cost 2.58 times as much now—which is about $4.12 per foot. We framed our ties on the ground 20 years ago, while today ties are sized at the mill; but we are applying fireproof iron on bridges today, the extra labor for which will offset the framing of ties. Therefore, I do not think that we are paying an unreasonable price for the amount of work performed as of 20 years ago, if we consider the increased cost of wages in its proper relation to work of this kind.

* From the M-K-T Magazine.
† February, 1926, page 42.

Consolidation Opposed—A report by an examiner of the Interstate Commerce Commission recommending that the proposed acquisition of the Buffalo, Rochester & Pittsburgh by the Delaware & Hudson would not be in the public interest was made public recently.

Getting the Manufacturers' Help

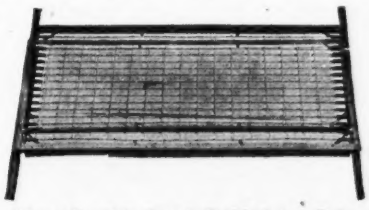
Current Developments in New and Improved Labor Saving Appliances



This Bunk Folds up Out of the Way

A DOUBLE-DECK steel bunk that can be folded for purposes of shipment or storage or for providing greater clear space in the bunk car or bunk house when the bunks are not in use, has been developed by the M. A. Hunt Company, Cincinnati, Ohio. The distinctive feature of this design is that with the legs on one side of the bunk screwed to a wall, the two springs and the other two legs may be folded so as to hang flat against the wall.

The four posts and the spring frames are made of steel angle bars with flat bars to serve as knee braces



The Hunt Double Bunk Folded for Shipment

at the corners. Joints not disconnected in folding are riveted. All other connections are made by means of notches which fit over shoulder rivets. Thus the connections can be made or disconnected much more quickly than if they were bolted and there are no loose bolts or nuts to be lost.

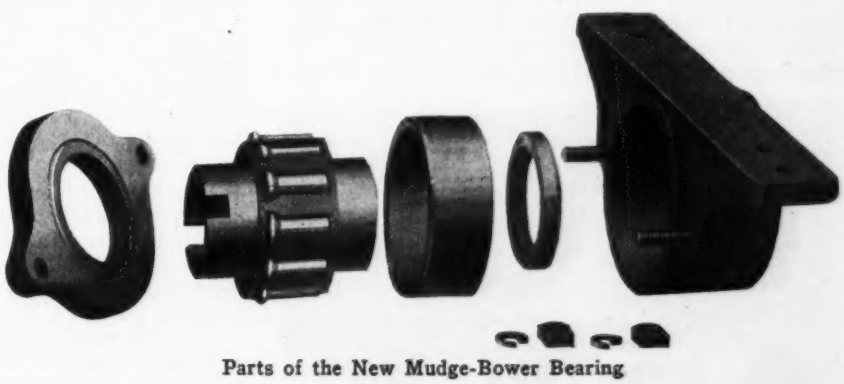
To fold the bunk, the lower spring frame is disconnected from the legs on one side and folded up until it is in a vertical plane flat against the other two legs. Next, the legs on the free side are folded up parallel to the free side of the upper spring, after which the upper spring is folded down until it hangs vertically against the lower spring. The weight of the double bunk, 6½ ft. long by 2½ ft. wide with 4½ ft. posts, is 82 llbs. The same system of folding may be applied to three-high bunks as well as to double bunks. By using bunks of this design greater use can be made of bunk houses.

New Mudge-Bower Roller Bearing

A MODIFICATION of the Bower roller bearing, for the purpose of adapting it especially to motor cars, trailers and push cars, has been perfected by Mudge & Co., Chicago, after two years' research in co-operation with several railroads and the bearing manufacturer. This new bearing is said to eliminate all tendency to cut the axle and the axle box when the car is heavily loaded.

This new bearing is made of high grade alloy steel throughout. The parts are carefully heat treated and ground and are inspected to microscopical limits before assembly into complete bearings.

The construction is such as to provide both a radial bearing and a thrust bearing, each independent of the other. The bodies of the four or five rolls that are in action at any given time take the radial loads, while the heads of all of the rolls take the thrust loads. Any radial loads, therefore, do not reduce the thrust-carrying capacity nor do thrust loads reduce the radial carrying capacity of the bearings. Both radial and thrust loads are carried on hardened inner and outer races instead of directly on the axle and the axle box, as before, thus enabling the bearing to take greatly increased loads without developing pressures that would cause wear or cutting.



Parts of the New Mudge-Bower Bearing

The bearing is sealed by automobile-type felt grease-retaining washers in the axle box, thus keeping the lubricant in and all dust and grit out. The only adjustment or attention required is the repacking of the bearing with fresh grease once a year.

The Mudge-Bower roller bearing can easily be ap-

plied to all types and makes of motor cars, push cars, and trailers using 1½-in., 1$\frac{7}{16}$-in. or 1$\frac{11}{16}$-in. axles. Most motor car, push car, hand car and trailer axles are either 1½ in. or 1$\frac{7}{16}$ in. in diameter, both sizes having 1$\frac{7}{16}$ in. bearing fit. It is said that the new Mudge-Bower roller bearing for axles of this size will safely carry a 100 per cent greater load than a 2-in. roller bearing 4 in. long of the type used heretofore, operating directly on a soft axle of .35 to 0.45 carbon steel, 165 Brinell hardness. As a consequence, the application of the new bearings to push cars, for example, will result in a definite increase in capacity, for instead of being limited by the load which can be carried on the axles without excessive wear, the capacity load will be subject only to the limitation of the axles as load-carrying members.

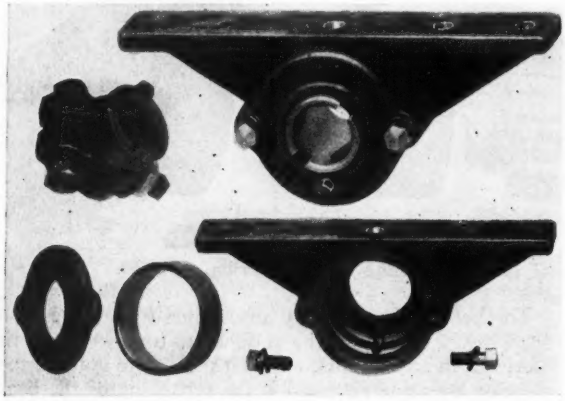
Motor Car Axle Bearings Are Made Oil-Tight

THE USE of piston ring packing on the long sleeve Bower roller bearings for the purpose of making them oil-tight is a new development applied by Fairmont Railway Motors, Inc., to the motor cars manufactured by that company. By this means felt washers

The Bower Roller Bearing Equipped With "Piston" Rings

and stuffing box material are eliminated and the bearings run in an oil bath, thus insuring effective lubrication and long life of the bearings. The oil can be flushed out without taking the bearing apart by unscrewing a drain plug.

The rollers do not travel directly on the axle but on a hardened steel sleeve which is held in place by a thrust collar clamped to the axle. A bevel of $\frac{3}{32}$ in. causes the rings to compress automatically when the sleeve is pushed into the case thus insuring an oil-tight fit.



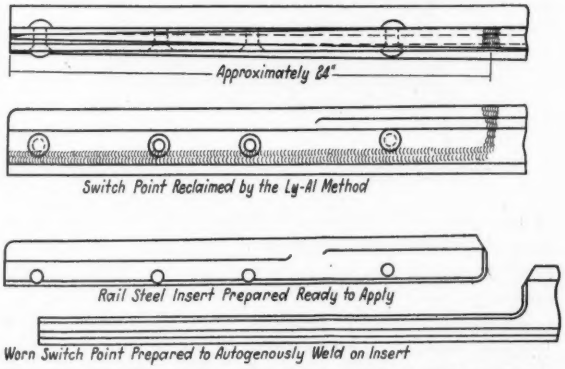
The Component Parts of the Bearing and the Bearing Assembled

If it is desired to use grease instead of oil, the oil hole at the top can be omitted and the drain plug replaced by a street ell and grease cup inclined upward, leaving no projection below the bearing case. The oil-tight feature of Fairmont ring-sealed roller bearings has been subjected to a long service test in ball bearing Fairmont engines in which piston ring packing on the crank shaft sleeves prevents leakage of oil mist and gasoline vapor under a pressure of 12 lb. per sq. in.

Considering the easier working conditions in a car bearing, it is the opinion of the manufacturers that these sealing rings will outlast the rollers, and they cannot dry or stiffen as felt packing does.

A New Method of Reclaiming Worn Switch Points

THE INTERSTATE Car & Foundry Company, Indianapolis, Ind., has developed a method of reclaiming worn switch points, known as the "Ly-Al" method, by which the switch is supplied with a new wearing surface conforming to the proper contour, extending from the point as far back as the metal has been worn or broken off. In doing the work, part of the web and all of the worn portion of the head of the switch rail are cut away and discarded, new material being machined to fit in the removed portion and then welded into place. The new material is selected from regular rail stock and before being welded is subjected to a heat-treating process to render the metal more resistant to wear. The greater portion of the weld is in the web of the rail, thus reducing to a minimum the area in which the wheels come in contact with the weld. When the heel of the switch point is battered or



The "Ly-Al" Method of Reclaiming Worn Switch Points

low an insert of rail steel is welded on to restore the head to its proper height. It is estimated that the saving on each switch point amounts to approximately $15, while reports on switches thus reclaimed which have now been in service for periods up to about two years indicate that the service life of the reconditioned switches is about double that of the original points.

The reclamation of the points is carried on at the company's shops at Indianapolis which are equipped with the necessary facilities for the proper prosecution of the work. In sending the switches to be reconditioned the railroads furnish about 30 in. of rail of the same section as the switch rail for each point, from which the repair part is obtained.

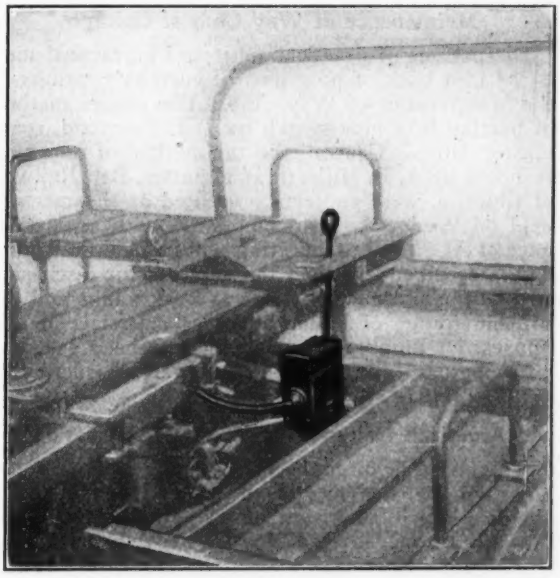
The company has reclaimed about 600 switch points to date for various large roads in the central

west, including the Pennsylvania, the Cleveland, Cincinnati, Chicago & St. Louis, the Illinois Central, the New York, Chicago & St. Louis and the Cincinnati, Indianapolis & Western. It is now repairing all of the worn switch points for one road of about 2,000 miles of line, while another road, on which its work has given satisfactory results, is considering a similar arrangement.

The company has also developed and is using a method for reclaiming worn manganese frogs and crossings by welding which is said to render them available for service for as long a period as the new units at a cost considerably less than that of new units, effecting a saving of about $50 for each frog so reclaimed, while the costs of reconditioning crossings in no case exceeds 75 per cent of the cost of a new crossing.

A Wico Magneto for Motor Cars

THE WICO Electric Company, of Springfield, Mass., has developed and placed on the market a magneto for railway motor cars, which is an adaptation of the Wico magneto which is used extensively on single cylinder gas engines in the United States and Canada. This new magneto is designed to meet the conditions encountered in motor car operation and to give a hot spark at slow cranking speeds, to operate under all weather conditions and to stand up under the high speeds and vibration of



Wico Magneto Installed on Motor Car

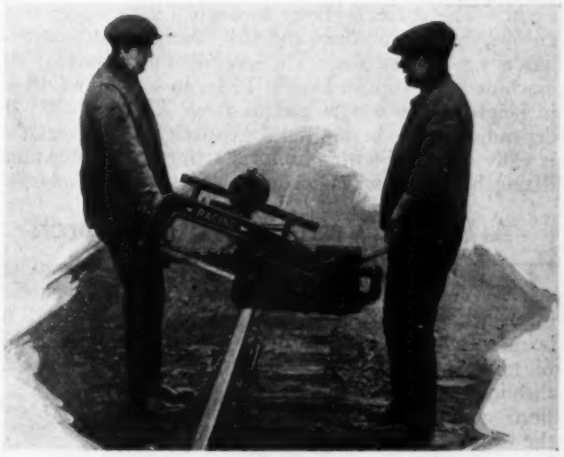
the car, this last characteristic being due to the absence of a rotating or oscillating armature within the necessarily close limits of the magnetic field and the delicate mechanisms which such an armature requires.

The new magneto drive is built on the same principle as the standard Wico eccentric and strap drive, the main difference being in the fact that the drive spring is used only when starting the engine. As soon as the timing lever is advanced, the magneto is operated by a direct push against the rocking arm by a shoulder on the driving rod. Both noise and wear are said to be negligible.

The Improved Racine High Speed Rail Cutting Machine

THE RACINE Tool & Machine Company, Racine, Wis., has recently improved its rail cutting machine by a new arrangement for mounting its electrical equipment and also by a change in the tank for holding water for cooling the saws in order to obtain a more compact unit. Cast steel has been substituted for cast iron in the base and other important parts, thus reducing the weight and providing greater strength.

The machine consists essentially of a power driven hacksaw mounted on a frame carrying an electric motor and other operating mechanism, with provisions for clamping the frame to the rail. Where the work consists in sawing off the ends of successive rails in track the machine may be moved easily from joint to joint by loosening the clamps and sliding it along the rail. The capacity of the regular machines is sufficient to handle rails with a height of 6½ in., but they may also be furnished for special sections up to 9 in. in height with a 6½ in. base. It is said that they will cut through a 100-lb. rail in from 12 to 16 minutes, or will cut down to the base of the same section in from 7 to 10 minutes. It is a common practice in using the machine to cut down to the base only and then to break the rail with a sledge.



The Machine Is Handled Easily by Two Men

The machine may be used with equal facility in sawing rail either in or out of track. Some roads are reconditioning rail with battered joints by sawing off

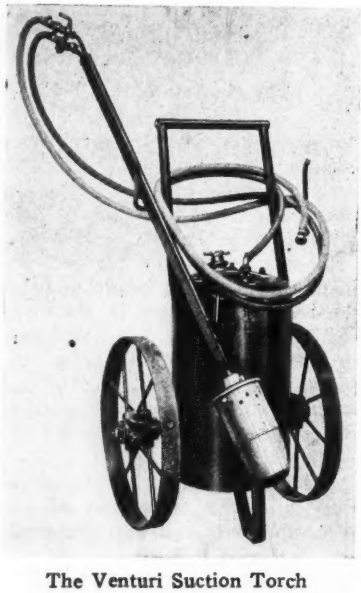
A Battery of Racine Machines at Work

the ends in track and report that they are effecting marked economies by this means. In such work power is obtained from portable generating units of which there are a number of types on the market. From the nature of the work and the small amount of power required for each machine several sawing units may be operated from one generating unit. The advantages claimed for this method are that it removes the joints to a new position to a firm bearing as the ballast under a battered joint is apt to be churned; that it saves the work of removing the rail and shipping it to a central point for sawing; and that there is no chipping or burring of the ends of the rails.

A ½ hp. motor is used, running at a speed of 1,750 r.p.m. The drive is direct through a worm gear with an oversize worm wheel and ball bearings, and the saw has a six-inch stroke. The overall dimensions of the machine are 36 in. in length, 14 in. in width and 18 in. in height. The weight ranges from 250 lb. to 325 lb. depending on the motor and the capacity. Each machine is fully equipped with a motor starting box, water tank, lifting handles, connection plug and six saw blades.

A Hauck Venturi Suction Torch

THE HAUCK Manufacturing Company, Brooklyn, N. Y., has placed on the market the Venturi suction torch which is so designed that the oil, instead of being forced through the hose by pressure within the oil tank, is drawn through it by suction created by the discharge of air from the air line in the nozzle of the torch. This method adds materially to the safety of operation since the flow of oil stops instantly if either the oil line or the air line should be cut or broken. The Venturi suction torch has been approved by the Underwriters Laboratories and the Factory Mutual Fire Insurance Companies' Laboratory.



The Venturi Suction Torch

The tank is made of seamless drawn pressed steel, with the bottoms interlapped and brazed while the connections for the fittings are welded. It is designed to withstand severe service.

A double wire gauze screen is provided in the filter connection to prevent the ignition of the oil or gases in the tank and a ball check in the filler cap seals the tank to prevent the escape of the oil if the tank should be tilted or overturned.

The tanks may be furnished in various sizes for different requirements. Pressure torches may be changed to suction torches by ordering only the suction burner, hose and oil syphon tube. These new torches have been introduced on a number of railroads, notably the Delaware & Hudson, the Chesapeake & Ohio, the Lehigh Valley and the Chicago & North Western, where they are said to have given good service.

With the Associations

Roadmasters' Association

The executive committee will meet in Chicago on December 11 to appoint committees and transact other business. A report will also be received from the committee appointed to select the headquarters hotel for the next convention.

Bridge and Building Association

The executive committee will meet at Chicago on December 4 to organize the work and to appoint committees for the ensuing year. The Hotel Nicollet has been selected as the headquarters hotel for the next convention which will be held in Minneapolis, Minn., on October 18-20.

Maintenance of Way Club of Chicago

Discussions of practical subjects by practical men is the idea back of programs of current meetings of the Maintenance of Way Club. The proper method of putting in a new switch by J. J. Desmond, roadmaster, Illinois Central, and the method of renewing turnouts by A. B. Hillman, roadmaster, Belt Railway of Chicago, were subjects presented at the meeting held on Wednesday, November 17, with an attendance of 70. The next meeting will be held on Thursday, December 16, when the subjects for discussion will be the allotment of tools to track gangs and the proper storage of tools and other materials in tool houses. A number of members have been asked to participate in the discussion of various phases of these problems.

American Railway Engineering Association

The board of direction of the engineering association and the members of the general committee of the Engineering division of the American Railway Association met in New York on November 16.

The Rail committee has been authorized by the board of direction to undertake laboratory experiments with a device designed to detect transverse fissures to determine its practicability for use in track.

The committees are rapidly completing their work and Secretary Fritch has already received two complete reports from committees, in addition to parts of three others. A number of committees have held meetings during the past two months, including the following: Water Service committee at Chicago on October 4; Wood Preservation committee at Chicago on October 5; Roadway committee at Chicago on October 14; Shops and Locomotive Terminals committee at Chicago on October 20; Electricity committee at New York on October 21; Records and Accounts committee at Cleveland, Ohio, on October 22;

Rail committee at New York on October 22; Wooden Bridges and Trestles committee at Chicago on October 28; Economics of Railway Labor committee at Chicago on November 4; Grade Crossing Design, Protection and Elimination committee at Chicago on November 5; Records and Accounts committee at Detroit on November 12; Yards and Terminals committee at Minneapolis, Minn., on November 15-16-17; Track committee at Chicago on November 16-17; Masonry committee at Chicago on November 18-19; Water Service committee at Chicago on November 19; and Rules and Organization committee at Chicago on November 19.

Wood-Preservers' Association

The following officers have been nominated for the American Wood-Preservers' Association to serve after the next convention, which will meet in Nashville, Tenn., on January 25-27, 1927. President, O. C. Steinmayer, superintendent timber preservation, Canada Creosoting Company, Montreal, Que.; first vice-president, H. R. Condon, assistant forester, Pennsylvania System, Philadelphia, Pa.; second vice-president, H. E. Horrocks, manager, Pacific Creosoting Company, Seattle, Wash.; secretary-treasurer, E. J. Stocking, Chicago; members executive committee: C. C. Cook, maintenance engineer, Baltimore & Ohio, Baltimore, Md.; William Steen, manager, Long Bell Lumber Company, Shreveport, La.

Metropolitan Track Supervisors' Club

Fifty-two members were present at a meeting held at the Hotel Martinique, New York City, on November 20. The main speakers at the meeting were to have been J. O. Hackenburg, general superintendent, Pennsylvania, and R. L. Pearson, engineer maintenance of way, New York, New Haven & Hartford. Neither man was able to attend however, Mr. Hackenburg on account of ill-health and Mr. Pearson, owing to the fact that his road was handling some 110 special trains to and from the Yale-Harvard football game at New Haven on the day of the meeting.

With some reluctance W. C. Kidd, Ramapo-Ajax Corporation, tendered his resignation as secretary-treasurer of the club, owing to his physical condition. As a tribute to Mr. Kidd and the services he has rendered the club, he was elected honorary secretary-treasurer for life, L. S. Walker, P. & M. Company, assistant secretary-treasurer of the club, being made acting secretary-treasurer.

The next meeting of the club will be held at the Hotel Martinique on Saturday, January 8, 1927.

Directory of Associations

American Railway Bridge and Building Association.—C. A. Lichty, secretary, 319 North Waller avenue, Chicago. Next convention, October 18-20, 1927, Minneapolis, Minn.

American Railway Engineering Association (Works in co-operation with the American Railway Association, Division IV).—E. H. Fritch, secretary, 431 South Dearborn street, Chicago. Next convention, Palmer House, Chicago, March 8-10, 1927.

American Wood Preservers' Association.—E. J. Stocking, secretary, 111 West Washington street, Chicago. Next convention, January 26-28, 1927, Nashville, Tenn.

Bridge Building Supply Men's Association.—B. J. Wilson, secretary, Pocket List of Railroad Officials, 1428 Lytton Building, Chicago, Annual exhibit at convention of American Railway Bridge and Building Association.

National Association of Railroad Tie Producers.—E. A. Morse, secretary, Potosi Tie & Lumber Company, St. Louis, Mo. Next convention January 28-29, 1927, Nashville, Tenn.

National Railway Appliances Association.—C. W. Kelly, secretary, Seeberger Building, 845 South Wabash avenue, Chicago. Annual exhibition March 7-10 during convention of American Railway Engineering Association.

Roadmasters' and Maintenance of Way Association.—T. F. Donahoe, secretary, 428 Mansion street, Pittsburgh, Pa. Next convention, September 20-22, 1927, Buffalo, N. Y. or Chicago.

Track Supply Association.—W. C. Kidd, secretary, Ramapo-Ajax Corporation, Hillburn, N. Y. Annual Exhibit at convention of Roadmasters' and Maintenance of Way Association.

The Material Market

THE railroads continue to comprise a most important element in the current activities of the iron and steel industry. Rail orders are the predominating factor. Among those placed in recent weeks are those of the Baltimore & Ohio, 80,000 tons; the Chicago & North Western (including the Omaha), 56,500 tons; the Chesapeake & Ohio and the Missouri Pacific, each 45,000 tons; the International-Great Northern, 25,000 tons; and the Southern, 46,825 tons, including 10,000 tons of 130-lb. rail.

Except for activity in railway buying, which includes a considerable volume of car and locomotive orders, with still larger orders in prospect, the demand for steel is rather limited, with a corresponding falling off in production. As a result prices have shown some weakness, although, as indicated in the table below, this tendency has not become apparent in definite reductions, except in the case of structural, shapes and bars.

Prices Per 100 Lb.

	October		November	
	Pittsburgh	Chicago	Pittsburgh	Chicago
Track spikes	$2.80 to $2.90	$2.90	$2.80 to $3.00	$2.90
Track bolts	3.90 to 4.25	3.90	3.90 to 4.25	3.90
Angle bars	..... to 2.75	2.75	.....	2.75
Tie plates, steel	2.25 to 2.35	2.35	2.25 to 2.35	2.35
Boat spikes	.....	3.25	.....	3.25
Plain wire	.....	2.50	.....	2.50
Wire nails, keg	.....	2.65	.....	2.65
Barb wire, galv.	.....	3.35	.....	3.35
C. I. pipe, 6 in., 12 in., ton	.....	47.20 to 48.70	.....	47.20 to 48.20
Plates	.....	1.90	.....	1.90
Shapes	2.00 to 2.10	2.10	.....	2.00
Bars, soft steel	2.00 to 2.10	2.10	.....	2.00
				2.60 to
Rivets, struc.	2.45 to 2.60	2.70	2.45 to 2.60	2.75
Conc. bars, billet	2.00 to 2.10	.....	2.00 to 2.10	.....
Conc. bars, rail	1.80 to 1.90	2.00	1.80 to 1.90	2.00
Rails, per gross ton, f. o. b. mills	.....	.....43.00	.....	.....43.00

As in all periods of reduced manufacturing activity, scrap is in less demand and scrap prices have been subject to weakness. This is apparent in the table below which shows that scrap prices for November are moderately less than those for October.

Per Gross Ton

	October	November
Relaying rails	$26.00 to $31.00	$26.00 to $31.00
Rails for rerolling	17.50 to 18.00	16.50 to 17.00
Rails less than 3 ft. long	17.50 to 18.00	16.25 to 16.75
Frogs and switches cut apart	16.00 to 16.50	14.50 to 15.00
Steel angle bars	16.25 to 16.75	15.00 to 15.50

The average volume of orders placed with member mills of the Southern Pine Association decreased from 603,112 ft. b.m. for the week ending September 17, to 454,308 ft. b.m. for the week ending November 12. years. Prices for Southern pine show a slight modification downward, while the normal quotation for Douglas fir shows no changes.

Southern Pine Mill Prices

	October	November
Flooring, 1x4, B and B flat	$45.83	$45.15
Boards, 1x8, No. 1	38.82	37.94
Dimension, 2x4, 16, No. 1, common	28.52	27.96
Dimension, 2x10, No. 1, common	31.70	32.36
Timbers, 4x4 to 8x8, No. 1	28.72	23.50
Timbers, 3x12 to 12x12, rough	42.82	.....

Douglas Fir Mill Prices

Flooring, 1x4, No. 2, clear flat	$27.00	$27.00
Boards, 1x8, 6 to 20, No. 1, common	16.00	16.00
Dimension, 2x4, No. 1, common	17.00	17.00
Dimension, 2x10, 16, No. 1, common	17.00	17.00
Timbers, 6x6 to 8x8, No. 1	20.00	20.00
Timbers, 3x12 to 12x12, rough	18.00	18.00

The following table of Portland cement prices are per barrel in carload lots, not including package. These prices are the same as those quoted last month.

New York	$2.15	Minneapolis	$2.32
Pittsburgh	2.09	Denver	2.85
New Orleans	2.30	Dallas	2.05
Chicago	2.10	San Francisco	2.31
Cincinnati	2.37	Montreal	1.15

Railway News Briefly Told

All previous records in tunnel driving were exceeded by the forces of A. Guthrie & Co., on the Cascade tunnel of the Great Northern when 1,157 ft. of tunnel were driven during the month ended October 31. The best previous record on this tunnel was 984 ft. for the month ended September 30, and the best record on the Rogers Pass tunnel for any one month was 932 ft.

The daily average movement of freight cars in September, 32.7 miles, was the highest ever reported for any one month and exceeded the best previous record, made in October, 1925, by one-half mile, according to a report compiled by the Bureau of Railway Economics. The average for September this year was an increase of 1.9 miles over that for September of last year and of 3.9 miles over September, 1924.

The Interstate Commerce Commission in a unanimous decision found that the proposed lease of the Virginian to the Norfolk & Western would not be in the public interest, basing the decision on the statement that all competition between the lines of the two companies, which are substantially parallel between Norfolk and Keeleysville, Va., would be eliminated and that important shipping points would be deprived of competitive service.

An automobile driver who attempted to cross the track ahead of the "Pan American" on the Louisville & Nashville at Hendersonville, Tenn., on November 16, not only caused the death of himself and his companion, but also derailed the train. The derailment was followed by a collision of trackmen's motor cars which had been ordered to the place of the accident, killing four trackmen and injuring eight others. No person on the train was killed and but a few were injured.

Two gatemen at crossings of the Long Island in Brooklyn, N. Y., have been held by the Homicide Court in bonds of $10,000 each, charged with manslaughter in connection with the wrecking of an automobile at one of the crossings, which resulted in the death of five persons. One of the gatemen is charged with failure to lower his gates on the approach of a train and the other is charged with failure to send this gateman the prescribed signal announcing the approach of the train.

In the annual report of the Department of Commerce the statement is made that "probably the most outstanding single industrial accomplishment since the war has been the reorganization of our American railways." In another place, the report cites the far-reaching effects of this reorganization which, by speeding up transportation, has greatly reduced inventories, contributed to the stabilization of production and employment and increased the efficiency of production and distribution.

The total length of railroads in the United States operated under the block system on January 1, 1926, was 110,824.6 miles, according to a bulletin prepared by the Bureau of Signals and Train Control Devices of the Interstate Commerce Commission. Of this total, 45,596.9 miles were operated by automatic signals and 65,227.7 miles were non-automatic. The total mileage of light signals on the same date was 4,681, compared with a total of 3,529 on January 1, 1925, and of 2,494 on January 1, 1924.

The approval by the Interstate Commerce Commission of the proposed lease of the Lehigh & New England by the Reading, conditioned on its maintenance as an open route, was recommended by C. V. Burnside, assistant director of the Commission's Bureau of Finance, in a proposed report made public on November 12. The lease had been opposed by the Pennsylvania, which had proposed a joint control of the line, one of the important gateways to New England, by the Pennsylvania, the New York Central, the Baltimore & Ohio, and the Reading.

The arbitration board which has been holding sessions in New York to consider the wage requests of the trainmen and enginemen of the eastern roads since the hearings closed on November 12, adjourned until November 30. Following the adjournment, Edgar E. Clark, former interstate commerce commissioner and the chairman of the board, left for Washington, where it is believed he went to prepare the statement of the board with relation to its position in the case. The board has until December 12 to issue its opinion.

The Chicago, North Shore & Milwaukee electric line has placed in service specially designed flat cars and trailer truck equipment for the expeditious handling of merchandise between Chicago and Milwaukee, Wis. The trailers will be hauled by motor trucks to a central loading station, where they are mounted on the flat cars without the wheels being removed, interlocking devices holding the trailers securely in place during transit. The trailers are of 8-tons capacity each, with metal container bodies, 7 ft. wide and 17 ft. long. Each flat car contains two trailers.

The Chicago, Milwaukee & St. Paul will apply roller bearings to 63 of its passenger cars, as well as to 64 Pullman cars which operate over its lines. Tests have indicated that cars so equipped will insure the advantages of reduced train resistance, the practical elimination of rough handling in starting long trains, easier riding equipment, less chance of hot boxes, ample warning when defects develop, fewer flat wheels and a saving in lubrication. There is also a possible elimination of different engine ratings between summer and winter when there are wide variations in the temperatures of the air.

All previous records for the loading of revenue freight were broken during the week ended October 30, when the total amounted to 1,216,432 cars, exceeding the record for the week ended October 16, when 1,210,163 cars were loaded, by 6,269 cars. The loading of coal during the week ended October 30, also established a new record of 236,776 cars. For the week ended November 13, loadings showed a seasonal decline, amounting to 1,112,886 cars, an increase of 62,946 cars, as compared with the corresponding week in 1925 and of 96,043 for that of 1924. The cumulative total for the first 45 weeks of the current year is 47,508,009 as compared with 45,542,689 and 43,169,496 for the corresponding periods in 1925 and 1924, respectively.

The Interstate Commerce Commission has authorized the Ft. Worth & Denver City, a subsidiary of the Chicago, Burlington & Quincy, to construct a line from Estelline, Tex., westerly to a point in Castro County, approximately 132.5 miles, with branches to Lubbock and Silverton, approximately 50.5 miles and 19 miles, respectively. The Quanah, Acme & Pacific, a subsidiary of the St. Louis-San Francisco system, was also authorized to build a 27-mile extension from McBain, Tex., to Floydada. The applications of the Pecos & Northern Texas, a subsidiary of the Atchison, Topeka & Santa Fe, and of the Texas, Panhandle & Gulf, an independent company, to build lines, 88 miles and 360 miles in length, respectively, were denied.

Personal Mention

General

W. J. Whalen, roadmaster on the C. M. & G. line of Chicago, Milwaukee & St. Paul, with headquarters at Joliet, Ill., has been promoted to trainmaster, with headquarters at Montevideo, Minn.

George W. Curtis, assistant superintendent on the Pittsburgh division of the Pennsylvania, and whose railway experience has included engineering and maintenance, has been promoted to superintendent of the Norfolk division, with headquarters at Cape Charles, Va. Mr. Curtis was born on May 8, 1878, at Washington, D. C., and graduated from Princeton University in 1902. He entered railway service in the same year as rodman on the Pennsylvania. He was promoted to assistant supervisor in 1903 and to supervisor on the Sunbury division in November, 1912. He was transferred to the valuation department in 1915 and in June, 1917, he was transferred to the Cumberland Valley division as supervisor, with headquarters at Chambersburg, Pa. In the same year he was promoted to assistant trainmaster on the Monongahela division, and in July, 1918, to trainmaster. He was promoted to assistant superintendent on the Pittsburgh division in November, 1923, which position he was holding at the time of his promotion to superintendent.

G. W. Curtiss

Hugh E. Hale, engineer, Eastern group, President's Conference Committee on Federal Valuation, with headquarters at New York, has been elected vice chairman. Mr. Hale was born on April 8, 1874, in Minnesota, and graduated from Lehigh University in 1897. He entered railway service in 1891 as a rodman on the Pennsylvania, being promoted to assistant supervisor on April 10, 1898, and to supervisor of signals at Camden, N. J., on February 1, 1901. He entered the service of the Baltimore & Ohio as an assistant engineer on March 17, 1902, and in May of the same year was promoted to division engineer with headquarters at Philadelphia, Pa. On December 15, 1903, he was promoted to superintendent at Butler, Pa., where he remained until September 1, 1904, when he was again made division engineer with headquarters at Baltimore, Md. On June 1, 1905, Mr. Hale was promoted to engineer maintenance of way with the same headquarters, remaining in this position until June, 1908, when he entered the service of the Missouri Pacific as assistant engineer at St. Louis. He was promoted to engineer of design in September, 1909, and to principal assistant engineer with the same headquarters, in April 1910. In August, 1911, he was promoted to engineer maintenance of way of the Southern district, with headquarters at Little Rock, Ark., remaining in that position until March, 1914, when he was appointed engineer, Eastern group, President's Conference Committee on Federal Valuation, which position he was holding at the time of his recent election as vice president of that organization.

H. E. Hale

Frederick Jasperson, assistant chief engineer of the Reading, with headquarters at Philadelphia, Pa., has been appointed shipping and freight agent of the Port Richmond Terminal and manager of the Philadelphia Grain Company, succeeding **O. H. Hagerman,** deceased.

N. C. Peterson, general roadmaster on the Union Pacific, with headquarters at Omaha, Neb., has been promoted to assistant to the general manager as maintenance of way inspector, with the same headquarters and with jurisdiction over the lines from Council Bluffs, Iowa to Ogden, Utah.

Abram R. Ponder, vice president of the San Antonio, Uvalde & Gulf and superintendent of the San Antonio division of the Missouri Pacific System, with headquarters at San Antonio, and an engineer by training and experience, has been promoted to executive assistant to the vice president, with the same headquarters. Mr. Ponder was born on August 22, 1867, near Doniphean, Mo., and was educated at the School of Mines at Rollo, Mo. He entered railway service in 1893 with the Cape Girardeau & Ft. Smith as assistant chief engineer, with headquarters at Cape Girardeau, Mo., and in 1894 left that road to enter the service of the St. Louis, Kennett & Southeastern in a like capacity, with headquarters at Kennett, Mo., being promoted to superintendent in 1898 and to general superintendent in 1901. In 1904, Mr. Ponder retired from railway service to become identified with the telephone company at Cape Girardeau, but returned to railway service in 1909, when he was elected president of the Crystal City & Uvalde, with headquarters at Crystal City, Texas, becoming also general manager, with headquarters at San Antonio, Texas, when the line was extended in 1912 and renamed the San Antonio, Uvalde & Gulf. In 1919 he was appointed receiver and general manager and in 1925, when control of the road was acquired by the Missouri Pacific he was appointed superintendent of the San Antonio division which includes the San Antonio, Uvalde & Gulf, the Asherton & Gulf, the Asphalt Belt and a portion of the International-Great Northern, which position he held until his recent promotion to executive assistant to the vice president with jurisdiction over the International-Great Northern and the Gulf Coast Lines.

A. R. Ponder

Engineering

A. A. Matthews has been appointed chief engineer of the Denver & Salt Lake, with headquarters at Denver, Colo., succeeding **R. D. Stewart,** who has been assigned to other duties on account of ill-health.

R. A. Morrison, track supervisor on the Perre Marquette, with headquarters at Saginaw, Mich., has been promoted to assistant division engineer on the Chicago-Petoskey division, with headquarters at Grand Rapids, Mich., succeeding **H. J. Bogardus,** whose promotion to division engi-

neer, with headquarters at Saginaw, was noted in the November issue.

R. J. Davis, acting valuation engineer of the St. Louis-San Francisco, with headquarters at St. Louis, Mo., has been promoted to valuation engineer with the same headquarters.

L. L. Kerner, assistant on an engineering corps, has been promoted to assistant division engineer on the Akron division of the Baltimore & Ohio, with headquarters at Akron, Ohio, succeeding **C. R. Adsit,** who has been transferred to the Chicago division with headquarters at Garrett, Ind., to replace **J. W. Purdy,** whose promotion to district bridge inspector, with headquarters at Akron, is noted elsewhere in this issue. **L. F. Rybolt,** assistant on the engineering corps at Newark, Ohio, has been promoted to assistant division engineer on the Cincinnati, Indianapolis & Western, with headquarters at Indianapolis, Ind., succeeding **P. H. Johnson,** whose promotion to district bridge inspector, with headquarters at Cincinnati, Ohio, is noted elsewhere in this issue.

Arthur J. Gayfer, whose promotion to division engineer of the Melville division of the Canadian National was noted in the October issue, was born on January 26, 1877, at Uxbridge, England, and entered railway service with McKenzie, Mann & Co., on April 10, 1898, on what was afterwards the Canadian Northern (now a part of the Canadian National). He was promoted to resident engineer on construction in 1902, serving in that capacity until 1905 when he became connected with the Grand Trunk Pacific (now a part of the Canadian National) in the same capacity. In 1906, he was promoted to division engineer and locating engineer in which position he remained until 1911, when he returned to the Canadian Northern as division engineer on construction and locating engineer, which position he was holding at the time of his recent promotion to division engineer of maintenance. Mr. Gayfer served overseas in the World War from 1916 to 1919 as major and chief engineer on light railways with the 12th battalion railway troops in France and Belgium.

D. T. Daily has been appointed division engineer on the East Florida division of the Seaboard Air Line, with headquarters at West Palm Beach, Fla., succeeding **H. O. Kaigler,** transferred on account of health. Mr. Daily was born on November 15, 1894, at Salvo, N. C., and was educated at the North Carolina State College, from which he graduated in 1915. He entered railway service in January, 1916, as an engineering inspector on the Seaboard Air Line, and in August, 1917, became assistant right of way engineer, which position he held until February, 1918. From this date until December, 1918, Mr. Daily served in the army as second lieutenant with the 58th Field Artillery, and in January, 1919, he resumed service with the Seaboard Air Line in the capacity of assistant engineer, valuation department. He held this position until January, 1923, after which date he served consecutively as assistant to division engineer until February, 1925; assistant division engineer until February, 1926, and chief clerk to the engineer maintenance of way until September, 1926. The latter position he held at the time of his recent promotion to division engineer.

R. E. Dougherty, engineering assistant to vice-president R. D. Starbuck of the New York Central, with headquarters at New York City, has been promoted to engineering assistant to the president, with the same headquarters. George A. Harwood, from the time of his appointment as vice-preident in charge of improvements and devlopment until his death in the first part of November, was principal engineering adviser to the president, covering the entire New York Central system and Mr. Doughtery now becomes the direct adviser on engineering matters on the staff of the president, with duties covering the entire system. Mr. Dougherty was born at New York City on February 13, 1880, and graduated from Columbia University in 1901. He entered railway service with the New York Central on September 30, 1902, as a rodman and was subsequently promoted progressively to transitman, inspector and assistant engineer on construction on the Middle district. In December, 1904, he was appointed assistant engineer on grade crossing elimination, yard design, etc., with headquarters at New York, serving in this capacity until September, 1905, when he was promoted to resident engineer in charge of construction on the Eastern district. In 1907 he was promoted to assistant district engineer, serving in this capacity until 1910, when he was promoted to district engineer. In 1918 he was promoted to designing engineer, with jurisdiction over the lines east of Buffalo and with headquarters in New York City. On October 1, 1924, he was promoted to special engineer to the vice-president of the New York Central, with headquarters at New York, and on October 1 of the following year he was made engineering assistant to Vice-President R. D. Starbuck at New York, which position he held at the time of his recent promotion to engineering assistant to the president.

Frank C. Huffman, assistant engineer of maintenance on the Chicago & North Western, with headquarters at Chicago, has been promoted to assistant chief engineer, succeeding **Dan C. Rounseville,** who has retired under the pension rules of the company. **Frank W. Hillman,** division engineer, with headquarters at Chicago, has been promoted to assistant engineer of maintenance, with the same headquarters, to succeed Mr. Huffman. **O. T. Huseman,** assistant engineer on the Green Bay division, with headquarters at Green Bay, Wis., has been promoted to division engineer of the Ashland division, with headquarters at Antigo, Wis., to replace **C. H. Perry,** who has been transferred to Chicago to succeed Mr. Hillman.

F. C. Huffman

Mr. Rounseville was born on October 29, 1856, at Sheboygan Falls, Wis., and entered railway service on April 1, 1879, as a chainman on location on the Milwaukee, Lake Shore & Western (now a part of the Chicago & North Western). He served as instrumentman from 1882 to 1884, being promoted in the latter year to assistant engineer. He was promoted to division engineer in 1893. In 1895 he was appointed assistant engineer on the Chicago & North Western, and in 1897 was promoted to division engineer. In 1906, he was appointed resident engineer on the construction of the Manitowoc, Green Bay & North Western (now a part of the Chicago & North Western), returning to the Chicago & North western as division engineer in 1907. He was resident engineer on the construction of the Milwaukee, Sparta & North Western from 1909 to 1912 and from 1912 to 1914 was resident engineer on the construction of the St. Louis, Peoria & North Western, both of which roads are now parts of the Chicago & North Western. He was promoted to engineer of maintenance of the Chicago & North Western in 1914, and to assistant to the chief engineer in 1918, this being followed by his further promotion to assistant chief engineer in 1920, which position he was holding at the time of his recent retirement.

Mr. Huffman was born on October 26, 1876, at Milford, Ind., and graduated from Purdue University in 1905, entering railway service with the Cleveland, Cincinnati, Chicago & St. Louis in 1903, prior to his graduation. He entered the service of the engineering department of the Pennsylvania in 1905 and in 1906 returned to the engineering department of the Big Four, leaving in the same year to enter the service of the Chicago & North Western, with which company he has since been identified except during 1908 when he was assistant state engineer of South Dakota. He served in various capacities in the engineering department of the North Western, including that of assistant

resident engineer on the Peoria-Girard line in 1912 and 1913, and was promoted to principal assistant engineer, with headquarters at Chicago in 1918. He was promoted to assistant engineer of maintenance in 1920, which position he was holding at the time of his recent promotion to assistant chief engineer.

Mr. Hillman was born in England on February 25, 1880, and graduated from the University of Illinois in 1905. He entered railway service in 1893 as an office boy in the office of the assistant engineer of maintenance and construction in the engineering department of the Illinois Central, serving in this capacity until 1899. After leaving college he was appointed assistant engineer on construction on the Illinois Central and in 1906 became a draftsman for Ralph Modjeski, consulting civil engineer. He became a structural draftsman on the Chicago & North Western in 1907 and was promoted successively to assistant engineer, resident engineer and, in 1918, to division engineer, with headquarters at Madison, Wis. He was transferred to Chicago in 1919 where he was located at the time of his recent promotion to assistant engineer of maintenance.

Track

G. H. Warfel, general roadmaster on the Union Pacific, with headquarters at Kansas City, Mo., has been transferred to Omaha, Neb., where he succeeds **N. C. Peterson,** whose promotion to assistant to the general manager is noted elsewhere in this issue.

B. H. Bryant, motor car inspector and formerly a section foreman on the Chicago, Rock Island & Pacific, has been promoted to roadmaster at Amarillo, Tex., to replace **J. E. Crawford,** who has been transferred to Pratt, Kan., succeeding **S. J. Covey,** retired.

E. T. Lytle, assistant engineer on the Missouri-Kansas-Texas, at Dallas, Tex., has been promoted to roadmaster, with headquarters at Denison, Tex., succeeding **Fred Huuter** who has been transferred to Smithville, Tex., to take charge of a newly created territory. **G. M. Luther,** assistant engineer at Parsons, Kan., has been promoted to roadmaster, with headquarters at Wichita Falls, Tex., succeeding **J. A. Spurlock,** who has been transferred to Smithville, Tex., where he relieves **J. J. Gallegher,** who has been transferred to Mokane, Mo.

A. W. Hervin, roadmaster on the Chicago, Milwaukee & St. Paul, with headquarters at Three Forks, Mont., has been promoted to roadmaster and trainmaster on the C. M. & G. line, with headquarters at Joliet, Ill., succeeding **W. J. Whalen,** whose promotion to trainmaster, with headquarters at Montevideo, Minn., is noted elsewhere in this issue. **C. A. Drawheim,** a former roadmaster, who has been general foreman in charge of the district rail laying gang on the Northern district, has resumed his duties as roadmaster of the Janesville line of the C. & M. division, with headquarters at Milwaukee, Wis., replacing **W. T. McNamara,** who has been transferred to Aberdeen, S. D., where he succeeds **L. Hansen.**

O. L. Fisher, assistant track supervisor on the Philadelphia Terminal division of the Pennsylvania, with headquarters at Philadelphia, Pa., has been promoted to branch line supervisor on the Monongahela division, with headquarters at Youngwood, Pa., where he replaces **W. R. Parvin** who has been transferred to the New York division, with headquarters at Jersey City, N. J., to succeed **J. McCoy** who has been assigned to special duties in the office of the engineer maintenance of way at New York City. **C. J. Code** has been appointed supervisor of the Allegheny division of the Pennsylvania, with headquarters at Oil City, Pa., succeeding **J. T. Ridgely,** who has been transferred to Freedom, Pa. **G. N. Walton** has been appointed supervisor on the Buffalo division, with headquarters at Mt. Morris, N. Y., and **H. R. Rochenbach** has been appointed supervisor on the Panhandle division, with headquarters at Steubenville, Ohio. **J. S. Pringle** has been appointed assistant supervisor on the Pittsburgh division, with headquarters at Trafford, Pa.; **G. M. Sauvain** has been appointed assistant supervisor on the Allegheny division, with headquarters at Kittaning, Pa., and **J. L. Huron** has been appointed assistant supervisor on the Conemaugh division, with headquarters at Freeport, Pa.

Jesse Ellison, section foreman on the Pere Marquette at Fairgrove, Mich., has been promoted to track supervisor on the Port Huron-Grand Rapids division, with headquarters at Saginaw, Mich., where he replaces **R. A. Morrison,** whose promotion to assistant division engineer, with headquarters at Grand Rapids, Mich., is noted elsewhere in this issue. **J. R. Phillips,** section and extra gang foreman, has been promoted to track supervisor on the Port Huron-Grand Rapids division, with headquarters at Edmore, Mich., succeeding **W. C. Cole,** who died suddenly on November 5.

A. L. Campbell, whose appointment as roadmaster on the Southern Pacific, with headquarters at Dunsmuir, Cal., was noted in the November issue, was born on May 18, 1899 at San Jose, Cal., and entered railway service on January 17, 1916, as a section laborer on the Southern Pacific. He was promoted to track walker on March 1 of the same year and to assistant extra gang foreman on December 31, 1917. This was followed by his promotion to section foreman on June 7, 1918, and on March 19, 1919, he was transferred to the Stockton division as assistant yard foreman. He was again made section foreman on June 1, 1919, and was promoted to extra gang foreman on February 7, 1921, being transferred to the Sacramento division on March 20, 1922. He then served as roadmaster's clerk from October 9, 1922, to February 9, 1923, when he resumed the duties of extra gang foreman. He was promoted to general foreman on March 29, 1923, and was again made a section foreman on December 8 of the same year in which position he remained until June 21, 1924, when he was promoted to general foreman in the engineering department. He served as an office man from January 1 to April 1, 1925, when he was promoted to general foreman of construction, which position he was holding at the time of his recent promotion to roadmaster of the newly formed Dunsmuir district of the Shasta division.

Bridges and Buildings

C. Simensen, supervisor of bridges and buildings on the Pasco division of the Northern Pacific, with headquarters at Pasco, Wash., has retired under the age limit rule, having reached the age of 70. He was in the employ of the Northern Pacific for 30 years.

J. W. Purdy, assistant division engineer of the Chicago division of the Baltimore & Ohio, with headquarters at Garrett, Ind., and **P. H. Johnson,** assistant division engineer of the Cincinnati, Indianapolis & Western, a subsidiary of the B. & O., with headquarters at Indianapolis, Ind., have been promoted to the newly created positions of district bridge inspector, with headquarters at Akron, Ohio, and Cincinnati, Ohio, respectively.

Purchasing and Stores

C. B. Sauls, division storekeeper on the Illinois Central, with headquarters at McComb, Miss., has had his jurisdiction extended over the Gulf & Ship Island lines of the Illinois Central, succeeding **G. B. Hopkins,** who has been appointed storekeeper at Gulfport, Miss.

E. J. Becker, general inspector of stores and supply train service on the Southern Pacific, with headquarters at San Francisco, Cal., has been promoted to traveling storekeeper, with the same headquarters, succeeding **J. E. Perry,** on leave of absence. **J. C. Neph,** assistant district storekeeper, with headquarters at El Paso, Texas, has been promoted to general inspector of stores and supply train service to succeed Mr. Becker.

J. F. Newman, storekeeper on the Pennsylvania with headquarters at Pitcairn, Pa., has been transferred to Pittsburgh, Pa., to succeed **W. C. Livingstone,** who has been transferred to Mr. Newman's former place at Pitcairn. **W. W. Shugarts,** assistant storekeeper at Altoona, Pa., has been promoted to storekeeper with the same headquarters, succeeding **H. R. Wood,** relieved on account of illness, and

R. F. Homer has been appointed acting assistant storekeeper at Altoona, succeeding Mr. Shugarts.

Eugene A. Clifford, assistant general purchasing agent on the Atchison, Topeka & Santa Fe, with headquarters at Chicago, has been appointed general purchasing agent of the Chicago & North Western and the Chicago, St. Paul, Minneapolis & Omaha, with the same headquarters, succeeding **F. J. Berck,** who has been assigned to other duties. Mr. Clifford was born on August 12, 1878, in Ireland, and received his education at St. Ignatius' College, Chicago. He entered railway service on April 10, 1901, with the Atchison, Topeka & Santa Fe, serving in various capacities until November, 1910, when he was promoted to chief clerk in the purchasing department. Three years later he was again promoted to assistant general purchasing agent, a position he held at the time of his resignation to become general purchasing agent of the North Western. During the life of the United States Railroad Administration Mr. Clifford served as a member of the purchasing committee of the Central Western region, and during the coal and railroad strike of 1922, he represented the western roads at Washington, D. C., in the distribution of coal, in co-operation with the President's coal committee.

Obituary

Carl F. Heintze, formerly assistant chief engineer of the Hilo Railway of Hawaii, and later superintendent of construction for the California Highway Commission, died on October 11, at Sacramento, Calif.

George A. Harwood, vice president in charge of improvements and development of the New York Central Lines, with headquarters at New York, died on November 4 of heart disease while undergoing an operation in a hospital at White Plains, N. Y. Mr. Harwood was born at Waltham, Mass., on August 29, 1875, and was educated at Tufts College from which he graduated in 1898. He entered railway service in 1893 in the engineering department of the Fitchburg railroad (now a part of the Boston & Maine) and remained with that road until 1900, with the exception of the time spent in college, on which latter date he entered the service of the engineering department of the New York Central. He was promoted to chief engineer of improvements in the electric zone and was in charge of the construction of the Grand Central Terminal and general improvements of the lines under electrification in the metropolitan area, later handling in addition special work in connection with other improvements and developments in New York, Buffalo, Cleveland and other places. On July 1, 1916, he was promoted to engineering assistant to the vice president of the New York Central Lines and on June 10, 1918, he was made engineering assistant to the federal manager of the New York Central railroad. The following July he was appointed corporate chief engineer of all the roads embraced in the New York Central Lines and on the return of the railroads to private control in 1920 he was promoted to engineering assistant to the president. In April, 1924, he was promoted to vice president in charge of improvements and developments, which position he was holding at the time of his death.

G. A. Harwood

A loss of 52 cents was sustained on each meal served on the dining cars of the Southern Pacific in 1925, according to figures compiled by F. O. Edwards, general auditor.

Construction News

The Alabama, Tennessee & Northern has been authorized to construct an extension of its line from Summit, Ala., to the Port of Mobile, a distance of 30 miles, to give the railroad entrance to the port.

The Arkansas & Louisiana Missouri contemplates the construction of a combined freight and passenger station at Bastrop, La., with track changes and added yard facilities to be performed by company forces, estimated to cost $37,500.

The Atlanta & St. Andrews Bay has in progress a survey for the construction of a line between Dothan, Ala., and Columbus, Ga., 100 miles.

The Atchison, Topeka & Santa Fe contemplates the construction of a water treating plant at Blackwell, Okla., including a 24-ft. by 60-ft. treating tank.

The Atlantic Coast Line has awarded a contract to the Ogle Construction Company, Chicago, for the construction of a 500-ton automatic electric reinforced concrete coaling station at Thomasville, Ga. A contract has also been awarded for shops at Chatmar, Fla., estimated to cost $60,000.

The Boston & Albany has awarded a contract to the J. F. Fitzgerald Construction Company, Boston, Mass., for the construction of an enginehouse and layout at Worcester, Mass.

The Canadian National has awarded a contract to J. H. Simmonds, Winnipeg, Man., for the construction of a station at Armstrong, Ont. The construction of a new passenger station at Edmonton, Alta., is contemplated by this company.

The Central of New Jersey has awarded a contract to the McClintic-Marshall Company, Inc., Pittsburgh, Pa., for the erection of three 3-span half-through steel plate girder highway bridges with steel column bents at Hall and New Brunswick avenues and Market street, Perth Amboy, N. J., estimated to cost $66,062. A contract has also been awarded to F. H. Clement & Co. for the construction of concrete masonry for ash pit crane foundations, inspection pit, water tank foundation and two water column foundations, together with a drainage system at the engine terminal at Bethlehem, Pa., estimated to cost $28,800.

The Chesapeake & Hocking, a subsidiary of the Chesapeake & Ohio, has awarded contracts for the construction of the eight sections of its new line between Valley Crossing, Ohio, and Gregg, 63 miles, at an estimated cost of $12,371,100, as follows: (1) Fritz, Rumer Company, Columbus, Ohio, (2) Ferguson & Edmondson Company, Pittsburgh, Pa., (3) Sterman-Dillard Company, (4) Dominion Construction Company, (5) and (6) Walsh Construction Company, Davenport, Iowa, (7) A. Guthrie & Co., St. Paul, Minn., (8) H. W. Nelson, Chicago.

The Chicago, Milwaukee & St. Paul will construct a one-story frame and timber warehouse, 180 ft. by 84 ft., at Seattle, Wash., at an approximate cost of $25,000. This company contemplates immediate electrification of its line between Seattle, Wash., and Black River Junction, about 10 miles, at an approximate cost of $250,000. A contract has been let for the construction of a machine shop, 50 ft. by 70 ft., at Mason City, Iowa, at a cost of about $10,000.

The Cisco & Northeastern has been authorized to construct an extension of its line from Breckenridge, Tex., to Throckmorton, a distance of approximately 35 miles. The extension is intended to serve an area in Stephens and Throckmorton counties that is encircled, but not materially penetrated by railroads.

The Cowlitz, Chehalis & Cascade has awarded a contract for the construction of an extension between Lacamas, Wash., and Cowlitz, 14 miles, at a cost of about $467,000.

The Cleveland, Cincinnati, Chicago & St. Louis has awarded a contract to the Roberts and Schaefer Company, Chicago, for the installation of automatic electric coal hoist-

ing equipment for an existing coaling station at Greensburg, Ind.

The Georgia & Florida has completed a survey for the construction of a line between Augusta, Ga., and Greenwood, S. C., 56 miles.

The Great Northern contemplates the construction of an extension from Richey, Mont., to Circle, 33 miles, as part of the originally planned New Rockford-Lewistown cut-off. Plans have been submitted to the city engineer of Minneapolis, Minn., for a steel and concrete highway bridge over its right of way and that of the Minneapolis & St. Louis to replace a wooden structure. The elimination of several curves and the construction of a 350-ft. trestle in Scotia Canyon between Camden, Wash., and Scotia, has been authorized. Including the boring of an 800-ft. tunnel, the project will involve an expenditure of about $240,000. Track changes at Irby, Wash., to eliminate two bridges over Crab creek at an estimated cost of $53,000 have been authorized, with construction to be carried out by company forces. The company has also authorized a line revision near Lamona, Wash., which will eliminate four bridges and heavy curves at a cost of about $100,000. In the Kootenai canyon, near Bonner's Ferry, Idaho, authorization has been made for a change in line to remove tracks from a rocky bluff where falling boulders have delayed train movements. This project is expected to cost $100,000. Plans have been prepared for the remodeling of the station at Bellingham, Wash., at a cost of about $35,000. Company forces will replace a single track bridge over the Spokane river near Spokane, Wash., with a double track bridge at a cost of about $84,000.

The Houston & Shreveport, a subsidiary of the Southern Pacific, contemplates the construction of a viaduct at Shreveport, La., to carry its line over tracks of the Kansas City Southern. It also plans the extension of the yard at the same point, both projects to involve an expenditure of about $335,600.

The Indianapolis Union contemplates the elevation of seven miles of the line of the Belt Railroad, Indianapolis, Ind., which it controls, at a total cost of about $13,000,000. Included in the project, which will not be completed until 1935, are the relocation and rebuilding of a locomotive repair shop; the elimination of 23 street grade crossings and 4 railroad grade crossings; the construction of a five-track bridge 800 ft. long over the White river; and the construction of a classification yard of 500-car capacity.

The Illinois Central has asked permission of the New Orleans city council for authority to proceed with the construction of a passenger terminal to be located between Willow, Rampart, Calliope streets and Howard avenue, New Orleans, La., to cost about $4,000,000. The station building is expected to be four stories high with dimensions of 400 ft. by 100 ft. to accommodate 14 station tracks. It is estimated that $3,000,000 will be required to construct the building, with $1,000,000 additional for track rearrangement and other facilities. A contract has been awarded to Joseph E. Nelson and Sons, Chicago, for the construction of a powerhouse at Paducah, Ky., which with coal and ash handling equipment, engine room cranes and two 500,000 gal. steel tanks will cost about $300,000. This company contemplates the construction early in 1927 of improvements at Gulfport, Miss., to cost about $51,000, including a warehouse 50 ft. by 100 ft. in size, additional pier trackage facilities and extension of the fire protection equipment.

The Kansas City Southern has awarded a contract for the construction of a second track, including reduction of grades to 0.5 per cent for a distance of 6.2 miles, at Shreveport, La. Including separation of grades at street and railway crossings, the expenditure involved is $876,300.

The Minneapolis, St. Paul & Sault Ste. Marie has been ordered by the Minnesota Railroad and Warehouse Commission to construct a steel and concrete highway subway under the railroad line in Wright county, near Buffalo, Minn., the cost, $23,100, to be borne equally by the state and the railroad.

The Meridan & Bigbee River has awarded a contract to J. A. Perdue & Co., Pine Bluff, Ark., for the construction of a line from Meridian, Miss., to Myrtlewood, Ala., a distance of 50 miles, at an estimated cost of $1,250,000.

The Missouri-Kansas-Texas is preparing plans for the construction of a freight terminal and warehouse, for which 15 acres of land was recently acquired, on Gabel street between Lyle and South streets at Houston, Tex. The warehouse, which will be about 800 ft. long, and the terminal facilities are expected to involve an expenditure of $600,000.

The Missouri Pacific has awarded a contract to the American Construction Company, Omaha, Neb., for the construction of a two-story brick and concrete freight station at Omaha, to cost, with new trackage facilities and driveways, $220,600. A contract has been awarded to the Folwell-Ahlskog Company, Chicago, for the construction of a reinforced concrete mechanical coaling station of 250 tons capacity at Washington, Mo., involving an expenditure of $52,000. Authority has been granted to construct an extension of a branch line, whose present terminus is Hot Springs, Ark., to a point 11.82 miles distant in a northwesterly direction. The extension is for the purpose of serving a lumber mill under construction. A contract has been awarded to the Anton Beffa Contracting Company, St. Louis, Mo., for the wrecking of a group of buildings at St. Louis preparatory to the construction of a 25-story office building which is estimated to cost $1,500,000.

The Muscle Shoals, Birmingham & Pensacola closed bids on October 30 for the construction of the first unit of this line (a subsidiary of the St. Louis-San Francisco) from Aberdeen, Miss., to Aliceville, Ala.

The New York, New Haven & Hartford has awarded a contract to the J. N. Leonard Company, New Haven, Conn., for alterations to and extension of the car repair shop at the Lamberton street yard, New Haven, Conn., estimated to cost $125,000. This company has also authorized the construction of an addition to the boiler room at Norwood Central, Mass., estimated to cost $27,800.

The Northern Pacific has announced plans for the construction of two branch lines in Montana involving an expenditure of about $4,000,000. One will extend from Glendive, Mont., through Circle to Brockway, 63 miles, tapping an agricultural district in the eastern part of the state. The second is planned to extend from Florence, Mont., through Stevensville, to Hamilton, 25 miles, on the east bank of the Bitter Root river, and includes the abandonment of a portion of the existing Bitter Root branch on the west bank between the same points. The latter line is expected to serve an acreage of irrigated land. A steel and concrete highway subway will be constructed in conjunction with the Great Northern near Coon Creek, Minn., the county bearing one half the total expense of $50,900, and the railroads the remainder.

The Pennsylvania has awarded a contract to Hoeffer & Co., Chicago, for masonry for the subway at Fifty-first street, Chicago, in connection with the elevation of the Pan Handle tracks. A contract has also been awarded to the Armstrong & Latta Company, Philadelphia, for pile and concrete foundation work in connection with additional facilities for handling perishable freight at Oregon avenue, Philadelphia. A contract has been let to Battey & Kipp, Inc., Chicago, for the construction and installation of smoke-washing equipment at the roundhouse at Garfield boulevard, Chicago, at a cost of about $250,000. A contract has been awarded to Bentley Brothers Company, Cleveland, Ohio, for paving a driveway at the Woodland avenue freight station, Cleveland. A contract has also been awarded to the Hunter Construction Company, Youngstown, Ohio, for the erection of the superstructure of a bridge at Centre street, Ashtabula, Ohio.

The Reader Railroad has applied to the Interstate Commerce Commission for permission to construct a 63-mile line from Hope, Ark., to El Dorado and a 15-mile extension from the present line to McNeil, Ark.

The Reading has awarded a contract to the Roberts and Schaefer Company, Chicago, for the construction of a "N. & W." type electric cinder plant at Trenton, N. J.

The St. Louis-San Francisco has awarded a contract to the Ogle Construction Company, Chicago, for the installa-

tion of a two-track electric cinder unit at Kansas City, Mo. A contract for grading, bridging and drainage of 57 miles of line between Aberdeen, Miss., and Aliceville, Ala., a portion of the proposed extension from Aberdeen to Kimbrough, Ala., 152 miles, has been awarded to Ross Wogan & Co., Kansas City, Mo.

The Skagit River has awarded a contract to the Morrison Knudson Company, Boise, Idaho, for the construction of a line 4.3 miles in length between Gorge Creek and Diablo Canyon near Seattle, Wash., to cost about $243,400. This includes construction of four wooden Howe truss bridges.

The Southern Pacific has been ordered by the California Railroad Commission to construct highway subways under its line at the Glendale-Brand and the Los Feliz Boulevard crossings in Los Angeles county, California. A contract has been awarded for the construction of a steel and concrete fruit warehouse at New Orleans, La., 53 ft. by 370 ft. which with necessary trackage will involve an expenditure of $165,500. This company contemplates the construction of a passenger station at Merced, Cal., to cost about $150,000.

The Southern Kansas Industrial Belt has been denied authority by the Interstate Commerce Commission to construct a line of railroad extending from Fredonia, Kan., in a southeasterly direction, 3.858 miles, all in Wilson County, Kan. The proposed railroad would have connected at Fredonia with branch lines of the Atchison, Topeka & Santa Fe, the Missouri Pacific and the St. Louis-San Francisco.

The Texas & Pacific closed bids on November 9, for the construction of a two-story reinforced concrete and brick passenger station at Natchitoches, La., to cost about $50,000.

The Union Pacific will remodel, with its own forces, the crowding pens and loading chutes at the West Stock Yards at Valley, Neb., providing concrete floors and roofs, lowering the tracks to place the car floors level with the floor of the pens, providing inclines to the upper decks and laying additional tracks at an estimated expenditure of $52,000. Company forces will also lay a mile of additional side track, relocate 2,500 ft. of side track, and 7,000 ft. of main track, including the installation of necessary bridges at Loring, Kan., at a cost of $39,000. The company contemplates the construction of a new passenger station at Black Rock, Utah.

The Western Pacific has approved tentative plans for the construction of a freight terminal and industrial warehouse along Islais creek, San Francisco, Cal., at a cost of about $2,000,000.

Equipment and Supplies

The Chicago, St. Paul, Minneapolis & Omaha has ordered 15,000 tons of rails from the Bethlehem Steel Company.

The International-Great Northern has ordered 25,000 tons of rails from the Tennessee Coal, Iron & Railroad Company.

The Chicago & North Western has ordered 30,000 tons of rails from the Illinois Steel Company and 11,500 tons from the Inland Steel Company.

The Missouri Pacific has ordered 5,500,000 tie plates from the Colorado Fuel & Iron Company, of which 1,500,000 are for the International-Great Northern.

The Baltimore & Ohio has divided an order for 80,000 tons of rails among the Carnegie Steel Company, the Illinois Steel Company and the Inland Steel Company.

The Chesapeake & Ohio has divided an order for 45,000 tons of rails among the Illinois Steel Company, the Inland Steel Company and the Bethlehem Steel Company.

The Missouri Pacific has divided an order for 50,000 tons of rails among the Colorado Fuel & Iron Company, the Tennessee Coal, Iron & Railroad Company, the Illinois Steel Company and the Inland Steel Company.

The Southern has ordered 10,000 tons of 130-lb. rail, 32,650 tons of 100-lb. rail and 4,175 tons of 85-lb. rail from the Tennessee Coal, Iron & Railroad Company for delivery during the first six months of 1927.

Supply Trade News

Grant B. Shipley, consulting timber treating engineer, Pittsburgh, Pa., has been elected chairman of the board and chairman of the executive committee of the American Nickel Corporation, Clearfield, Pa.

J. E. M. Schultz, representative of the Sullivan Machinery Company, Chicago, with headquarters at Nashville, Tenn., has been promoted to manager of the office at Dallas, Tex., succeeding **D. H. Huster,** resigned.

J. B. Weigel, formerly general interlocking inspector of the Seaboard Air Line, has been appointed a representative on the railroad materials division of the Ohio Brass Company, with headquarters at Mansfield, Ohio.

J. J. Gilmore has been appointed manager of sales of the Birmingham, Ala., district of the American Steel & Wire Company, which has enlarged the scope of its Birmingham sales office to handle the company's entire line of products.

George A. Secor has been appointed district sales manager of the Buda Company, Chicago, with headquarters at St. Louis, Mo., succeeding **L. O. Stratton,** who has been transferred to western territory. **Porter L. Laughlin,** formerly district sales manager of the Verona Tool Works at Chicago has become associated with the Buda Company, with headquarters at Chicago.

W. H. Moyer, application superintendent and salesman of the Chipman Chemical Engineering Company, Inc., Bound Brook, N. J., has been appointed manager of the railroad division of that company with headquarters at Bound Brook, succeeding **T. B. Bowman.** Prior to his connection with the Chipman Company, which was made within the year, Mr. Moyer was connected with the Celotex Company, Chicago. He will be assisted in his new capacity by **H. B. Crocker** who has been appointed assistant manager of the railroad department with headquarters at Bound Brook. For the past 12 years, Mr. Crocker has been connected with the Santa Fe in various capacities, and at the time of his recent appointment he was in charge of the Santa Fe's laboratories at Topeka, Kan. Mr. Crocker is a graduate of the Kansas City Agricultural College.

P. W. O'Brien, assistant general manager of sales in charge of the rail bureau of the Illinois Steel Company, died at Chicago, on November 9, of pneumonia. Mr. O'Brien was born in 1860 and has been connected with the steel industry during the last 40 years. He entered the employ of the Illinois Steel Company on July 2, 1886, and since the formation of the United States Steel Corporation in 1901 was in charge of the rail bureau in the general offices of the Illinois Steel Company.

G. S. Brown, president of the Alpha Portland Cement Company, Easton, Pa., was elected president of the Portland Cement Association at its annual meeting at Chicago on November 18. Other officers were elected as follows: Vice-presidents, **E. M. Young,** president of the Lehigh Portland Cement Company, Allentown, Pa.; and **Robert B. Henderson,** president of the Pacific Portland Cement Company, San Francisco, Cal.; and treasurer, **J. W. Boardman,** vice-president of the Huron Portland Cement Company, Detroit, Mich.

George B. Durell, vice-president and general manager of the American Fork & Hoe Company, Cleveland, Ohio, has been elected president and general manager to succeed **W. H. Cowdery,** who has been elected chairman of the board. Mr. Durell organized the Chattanooga Tool Company, Chattanooga, Tenn., in 1887, of which he was secretary and later, manager. In 1890 he moved to Harriman, Tenn., where he organized the Harriman Hoe & Tool Company, of which he was president and general manager. At the time of the organization of the American Fork & Hoe Company in 1902 the Harriman company was merged with that company, and Mr. Durell was made treasurer of the new organization. He was later elected vice-president and in 1923 was also made general manager.

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Q & C Co.
Verona Tool Works
Woodings Forge & Tool Co.

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Oxweld Railroad Service Co.

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Buda Co.
Kalamazoo Railway Supply Co.

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Track Liners
See Liners, Track

Track, Portable
Western Wheeled Scraper Co.

Track Tools
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Industrial Works

Treating Plants, Water
American Water Softener Co.

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Massey Concrete Products Corp.

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Hastings Signal & Equipment Co.

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Welding & Cutting Equipment
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Fairmont Railway Motors, Inc.
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Woolery Machine Co.

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Mudge & Co.
Fairbanks, Morse & Co.

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Interstate Iron & Steel Co.

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